Vol. 70, No. 9 October 2004

Sculptures by Dr. Ivan Gasoi

Effective Diagnosis in Dental Practice

Is Dentistry a Profession?

Necrotizing Fasciitis of the Face

Oral Kaposi's Sarcoma in a Renal Transplant Patient

Macroeconomic Review of Dentistry in Canada in the 1990s

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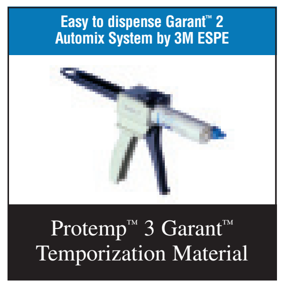

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An independent review* has concluded that oscillating-rotating technology, pioneered by Oral-B, is the most effective at reducing plaque and gingivitis.

*For more information, and to read the published abstract, visit the Cochrane Collaboration website at www.update-software.com/toothbrush.

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1 Heanue et al. Manual versus powered toothbrushing for oral health (Cochrane Review). In: The Cochrane Library, Issue 1, 2003, Oxford: Update Software. Full report online at www.update-software.com/toothbrush. BRAA32111 © 2003 Oral-B Laboratories

Editorial

A PROFESSION ON THE MOVE

Dr. John P. O'Keefe

Are there enough dentists in Canada? The answer to that question depends on your perspective. If you are a heavily indebted young dentist starting a practice in a large urban area, you may say that there are too many. If, on the other hand, you are a low-income patient in a rural area having difficulty in accessing care, you might have a totally different opinion.

Even if there is a range of answers to the opening question, it is a truism that in all countries there is a maldistribution of health professionals. According to Milton Roemer's classic work in the field, *National Health Systems of the World*, the richest urban areas invariably have the greatest numbers of professionals and the lower income rural areas have chronic shortages. Headlines in Canadian newspapers trumpet this "new" phenomenon, particularly in respect to physicians and nurses.

The Romanow Report on the future of health care in Canada highlighted impending shortages of health care workers and discussed strategies for solving the problem. However, the Report went on to caution rich countries against poaching health professionals from developing countries with the promise of higher earnings. Such developing countries can ill-afford to lose valuable human resources, often educated at a high cost to the state.

However, the migration of professionals will continue as before and will most likely accelerate as baby boomers retire in western developed countries. According to Roemer, physicians from India have historically migrated in large numbers, particularly to the U.S., the U.K. and Canada. And what of the migration of Indian dentists to the west? In a recent conversation with a Toronto-based dentist, I learned about an Indo-Canadian dental study club with approximately 300 names in their expanding database. A significant number of these practitioners received their dental education in India, notably from schools in the Bombay area and in a little place called Manipal (www.manipal.edu).

I had occasion to visit Manipal in early September, while I was attending the FDI Congress. When some faculty members of the dental school saw that I was a speaker at the Congress, they invited me to participate in a workshop on dental journalism. They held this workshop to gain insights into getting their articles published in the international peer-reviewed literature. They want to remove any barriers to disseminating the knowledge they generate.

What I saw in Manipal impressed me greatly. First, I was surprised to find that there were over 200 registrants for the workshop, many of whom were young postgraduate students and interns. In speaking to these bright young people, I was taken by their desire to educate and improve themselves. These people demonstrated that they are already knowledgeable and want to learn more. They are also very proud of attending dental school in Manipal, a "city of white coats". On a quick tour, the infrastructure of the dental school seemed fine, but it was the faculty members and students who really made this a special place.

Among the foreign undergraduates at the Manipal dental school, there are a number of Canadians, many of whom will presumably return to Canada. The mobility of Manipal dental graduates may soon be augmented if their current bid to gain accreditation status with the Dental Board of California (DBC) is successful. Since 1998, the DBC has been mandated by the state government to evaluate individual foreign dental schools and to accept their graduates if they meet certain criteria (see page 7 at http://www.dbc.ca.gov/pdf/newsletters/2002_10.pdf). To my knowledge, one Mexican dental school has already received accreditation approval by the DBC. Surely more will follow.

I expect this trend to increase in importance as baby boomer dentists retire in the years ahead. If you look around the world, the migration of dentists from developing to developed countries is a continuing phenomenon. While Canada has an exemplary means of educating and licensing dentists, perhaps we can learn more about the evaluation of foreign-trained dentists and dental schools from other jurisdictions like California, New Zealand and the U.K. On my recent travels, I heard of U.K. organizations actively recruiting dentists from a Baltic country that has recently joined the European Union, where professional mobility is relatively easy. The issue of professional mobility is not going away.

John O'Keefe
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1. Volpe AR, et al. J Clin Dent. 1996; 7 (suppl): S1-S14. 2. Data on file, Colgate-Palmolive Company. 3. Ayad f, et al. Clinical efficacy of a new tooth whitening dentifrice. J Clin Dent. 2002; 13:82-85. 4. Singh S, et al. The clinical efficacy of a new tooth whitening dentifrice formulation: A six-month study in adults. J Clin Dent. 2002; 13:86-90.
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President's Column

THE ABILITY AND THE WILL

Dr. Alfred Dean

The future of the health care system in Canada is a complicated and contentious issue. An article in the national press and a conference I attended in Calgary sparked my own thoughts on the future of health care in this country.

On August 5, André Picard of the *Globe and Mail* wrote an article about the lack of universal access to dental care services in Canada. His subtitle read, "A healthy mouth is part of a healthy body and too few Canadians see a dentist regularly. Let's make dental part of medicare." He quoted the federal Minister of State for Public Health as saying that Canada has a "health care system where the mouth is not considered a part of the body."

With this article fresh in my mind, I recently spoke at the International Congress on Special Care Issues in Dentistry. Over 400 delegates representing 35 countries gathered to discuss ways to improve access to and quality of oral health care for special needs and elderly patients.

In my remarks to these dedicated practitioners, I noted that at some point, all dentists are called upon to deliver care to special needs patients. We may treat an elderly patient with physical or mental ailments, an autistic child or a patient with Down syndrome. Many of us have been frustrated trying to find appropriate care for severely handicapped or bedridden patients in seniors' facilities. Discussions at the conference were not limited to finding the best ways to treat elderly or special needs patients. There was much discussion about the best ways to ensure access to care for *all* dental patients.

Mr. Picard's article and the Special Care conference have one common theme: access to care. Collectively, we must ask ourselves if we have the ability and the will to ensure that all Canadians receive the care we need and deserve.

Access to care is an issue that may arise at varying stages in one's life. If you are as old as I am or have elderly parents or children with disabilities, you are probably more concerned about the issue than the young adult. Yet if you are as old as I am, you will also remember when provinces had comprehensive dental care for children through to their teenaged years. Today in Nova Scotia, children are provided with basic dental treatment to the age of 10. This age level now varies from province to province. Times have changed.

The media talks about a looming shortage of practitioners in Canada. While there is conflicting evidence on this issue, I believe the number of practitioners is the least of our concerns. In terms of ability, we live in a prosperous country and can produce the dentists this country requires. However, we also need the will to provide adequate funding to our institutions. Canada has emerged from a period of extensive funding cutbacks to universities, teaching hospitals and health care in general. Results of these cuts can be seen with high tuition fees, fewer residency programs and operating room shortages.

One could argue that historically, Canada has not been adept at providing health care for the less fortunate — particularly the elderly and disabled. Many seniors enter facilities with a myriad of health problems, often without adequate resources to access required dental care. These seniors' facilities can also fail to recognize the importance of their residents' dental needs.

Which brings me back to Mr. Picard's suggestion of making dental care part of medicare. This notion is contradictory to CDA's position. We believe the appropriate path is to strengthen the social safety net and provide adequate funding to our dental faculties. We should not be so eager to dismiss the time-tested partnership of dentists, employers, insurers and patients in favour of merging dentistry into universal medicare. The medicare envelope is already stretched thin and suffers from many so-called warts — including long waiting lists and doctor shortages.

However, since Mr. Picard published his article, I have received feedback urging the profession to press for the inclusion of dentistry in the national medicare system. What do you think our approach should be? Your opinions are important to us.

We need your help. Please help us.

Alfred Dean, DDS
president@cda-adc.ca

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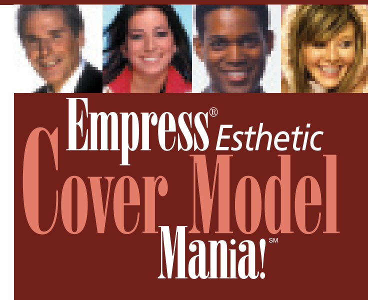

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Letters

Editor's Comment

The *Journal* welcomes letters from readers about topics that are relevant to the dental profession. The views expressed are those of the author and do not necessarily reflect the opinions or official policies of the Canadian Dental Association. Letters should ideally be no longer than 300 words. If what you want to say can't fit into 300 words, please consider writing a piece for our Debate section.

The Need for Apology in Dentistry

I read with interest Dr. Schwartz's article on the need for apology in dentistry.[1] I agree with most of what he says. It is essential to show empathy in our communications with our patients. This defuses potential situations of conflict, particularly in cases where the patient has not correctly understood us, even though we are certain that our explanations were crystal clear.

I would like, however, to clarify a few things regarding endodontic access cavities and insurance. What is now being taught is to initiate the endodontic access cavity without a dam, such that the long axis of the tooth can be better evaluated both mesiodistally and buccolingually by comparing it to its neighbours. This also helps ensure that the correct tooth is opened. The dam is then placed before proceeding with the treatment sequence.

With respect to professional liability insurance, the cost of basic coverage in Quebec is approximately $600, whereas for the 10 days of practice I do annually in a hospital in the neighbouring province of Newfoundland and Labrador (I live just 6 km from the border), I must pay $1,849 to CDSPI. No possibility of a daily rate, no flexibility. I certainly don't miss the days when CDSPI insured dentists in all provinces.

Dr. Bernard Jolicœur
Fermont, Quebec

Reference

1. Schwartz B. The need for apology in dentistry. *J Can Dent Assoc* 2004; 70(7):448–50.

Response from CDSPI

Thank you for the opportunity to respond to the letter from Dr. Jolicœur, in particular the last paragraph referring to professional liability insurance. Dr. Jolicœur is entitled to his opinion. The CDA malpractice plan (providing excellent complete protection to over 95% of dentists outside of Quebec and Ontario) and the Quebec malpractice program are not comparable, as they are completely different programs designed on completely different formats.

We asked the CDA insurer, ING Novex Insurance Company of Canada, to comment. Mr. Mike Stinson, vice-president of the Commercial Group, had this to say: "I recall the issue of minimal dental work being done coming up a number of years ago. The administrative difficulties in charging a premium based on actual number of procedures performed or the number of days worked would be enormous. Furthermore, would it be equitable to charge the same annual premium for each procedure? Although it is unfair in some degree, we as the insurer charge an annual premium regardless of the amount of the exposure in that year based on the plan experience. This is not unlike auto rating, which charges annual premiums that are not related to the number of miles driven."

Mr. Lyle Best
Chairman of the Board
CDSPI

Editor's Choice

Thank you for coming up with such a creative and useful service. I am very much interested in keeping up with relevant research and I spend a lot of time on CE. However, I don't have enough time to search out good peer-reviewed journals (other than *JCDA* and 1 or 2 other publications), so I look forward to the *Editor's Choice*. Congratulations for taking CDA ever farther into the online world. One useful extension of this initiative (perhaps already in place?) is an online forum to discuss and exchange views on the articles featured in this electronic publication. Articles sometimes raise questions and new lines of thinking, so a forum would be great way to discuss a topic. It may also provide direction for future articles. Once again, thank you for a great new direction. I hope this service is enjoyed by all.

Dr. Kris Klimek
North Vancouver, B.C.

Editor's Note: Our members' online discussion forum is up and running and we encourage all to join in discussing issues with colleagues from across Canada. Members' suggestions for improving our services are always welcome.

News

Rogue Dental Supply Company Declares Bankruptcy

Following our earlier investigations, CDA has obtained more information on the status of Gilbert's Medical Dental Supply ("Gilbert's") and its associated companies Dental Wholesalers of Canada Limited ("Dental Wholesalers") and Excel-Dent.

The individual controlling all of the above companies is Gilbert Allal.

Gilbert's recently filed a proposal to their creditors to settle for outstanding amounts. However, their creditors refused this unsatisfactory proposal. Therefore, Gilbert's and its associated companies were declared bankrupt.

Wasserman Associates Inc. ("Wasserman") are the bankruptcy trustees working on behalf of creditors owed money by Gilbert's. There is a significant amount of money owing to Canada Revenue Agency and 2 major banks. These secured creditors' claims will rank in priority to any unsecured claims.

Wasserman has provided CDA with Proof of Claim forms, to enable dentists to add their names to the list of unsecured creditors. Dentists can complete this form and fax or mail it back directly to Wasserman. The Proof of Claim form can be downloaded from the CDA Web site at: http://www.cda-adc.ca/pdfs/english/form31_proof_of_claim.pdf.

Please return the completed form to: Wasserman Associates Inc., Attention: Gloria Breen, CIRP, 5140 Yonge Street, Suite 2250, Toronto, ON M2N 6L7; fax: (416) 226-9562.

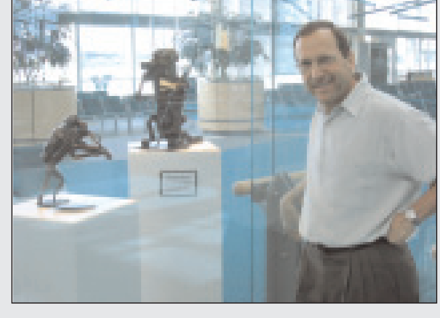
Many Canadian dentists still have outstanding monies owed to them by Gilbert's or the credit card companies. Typically, Gilbert's issued post-dated cheques to reconcile money owed, but many of these cheques have been returned NSF.

Therefore, if false or incorrect charges were placed on your credit card and you are still owed money, we recommend you take the following actions:

- Follow-up with the credit card company at your earliest opportunity. The credit card companies typically place a time eligibility limit on refunds, so it is in your best interest to act quickly.
- Complete and return a Proof of Claim form to Wasserman as described above.
- Keep copies of all correspondence showing your attempts to reconcile with Gilbert's and the credit card companies.
- Be sure to warn front-line staff about providing credit card details to rogue companies who solicit your business. The individuals behind these unsavoury dental supply companies could very well surface again under a different company name.

We are still in the process of gathering more information on this unfortunate episode and will endeavour to provide updates in further CDA publications. ◆

COVER ARTIST



Dr. Ivan Gasoi of Vancouver, B.C., initially started to work with ferrous metal in 1996. It was through the encouragement of his wife to find a hobby that he decided to pursue his interest in oxyacetylene welding. His fascination with the process of welding scrap metal quickly expressed itself as figurative art.

Inspiration for the work gracing this month's cover was the result of Dr. Gasoi's involvement with the Borealis String Quartet, a young and exceptionally talented group of musicians that is rapidly establishing a national reputation.

His passion for musical themes is also evident in *Swamp Duet*, a work that is currently on display at the Vancouver International Airport. The frog violinist and the alligator cellist have been prominently showcased for the past year. Dr. Gasoi has been invited to exhibit his work at a local Vancouver gallery in 2005.

A 1969 graduate of McGill University, Dr. Gasoi has maintained a general practice in Vancouver since 1971. ◆

Dr. Burton Conrod Re-Elected to FDI Council

Dr. Burton Conrod

At the FDI World Dental Congress held September 10–13 in New Delhi, India, CDA past-president Dr. Burton

Conrod was re-elected to FDI council. Dr. Conrod went through in the first round of voting, proving that support for his candidacy was strong.

Dr. Conrod's appointment will reinforce the visibility of Canadian dentistry on the international scene. "In today's global village, we have a unique opportunity through FDI to bridge the distance between our associations and bring the world of dentistry together as one with the aim of optimal oral health for all peoples," says Dr. Conrod. "FDI will become a stronger organization by improving its ability to support and strengthen member associations."

Dr. Conrod has been a member of the FDI Council for 3 years. In this time, he helped shape and guide FDI's future by actively promoting the importance of the FDI strategic plan and by participating in the development of FDI oral health statements. He also demonstrated an effective ability to help members with differing opinions and varying backgrounds reach consensus.

During his term as CDA president, Dr. Conrod oversaw the implementation of CDA's new strategic plan as well as a major governance review founded on the principles of the knowledge-based decision-making process.

CDA Specialist Representative Attends U.S. Meeting

Col James Taylor, chair of CDA's Committee on Specialist Affairs (COSA), was recently invited to attend the annual meeting of the U.S. Dental Specialties Group in Chicago. The group is composed of members from each of the 9 specialty organizations recognized by the American Dental Association. Issues discussed at the meeting were similar to those often considered by COSA: scopes of practice, accreditation, licensure and post-graduate training. Col Taylor reports that his U.S. colleagues were very interested to hear about Canada's progress in a number of key areas, including interjurisdictional portability of licensure within Canada.

Col James Taylor (fourth from left) in Chicago with the sitting presidents of the U.S. national dental specialty organizations.

Col Taylor explained that establishing a bridge with COSA's American counterpart, "is in direct support of one of the fundamental principles of the CDA Strategic Plan — one of CDA's key initiatives as a recognized leader in oral health is to maintain and enhance strategic alliances."

ABFO Publishes 'Dental Imprint' Position Paper

There have been recent reports in the media regarding the use of thermoplastic bite impression materials for the identification of children. Companies are marketing the use of these 'dental imprint' products as an effective means of recording the morphology of a child's dentition, as well as storing the impressions as a source of DNA and scent for future identification purposes.

The American Board of Forensic Odontology (ABFO), a certification board for forensic dentists in the United States and Canada, has published a position paper stating that this technique is of limited value when used for the dental identification of children. The paper goes on to note the technological and biological shortfalls of aiming such products at accurately identifying children.

ABFO cautions the companies marketing these products not to mislead the dental profession or the general public — especially fearful parents. ABFO believes this identification method should not be considered a valid substitute for accurately obtaining and storing conventional dental records.

The full text of the ABFO position paper can be found online at www.abfo.org.

U.S. Surgeon General Supports Fluoride

U.S. Surgeon General Richard H. Carmona has joined many previous Surgeons General in endorsing community water fluoridation as a cost-effective public health measure for preventing tooth decay. A significant advantage of water fluoridation, says Surgeon General Carmona, is that it can be enjoyed by all residents of a community, such that "income level or ability to receive routine dental care is not a barrier to receiving fluoridation's health benefits. Water fluoridation is a powerful strategy in our efforts to eliminate differences in health among people."

The statement is posted on the Web site of the Centres for Disease Control and Prevention at www.cdc.gov/OralHealth.

Association of Dental Surgeons Gets New Name

Effective October 2004, the Association of Dental Surgeons of British Columbia (ADSBC) became the British Columbia Dental Association. The name change was made to clarify its role as the professional organization for B.C. dentists and to make it easier for the public to access the association.

The opportunity to use the name "British Columbia Dental Association"

arose following an agreement by an organization of the same name to relinquish it. In doing so, the province will now have one unified group speaking on behalf of B.C. dentists.

The name change was approved at the June Annual General Meeting of the ADSBC.

Last Notice About RCDC's Final Interim Examination

Just a reminder that the Royal College of Dentists of Canada (RCDC) will hold its last Interim Examination on Saturday, November 20, 2004, as part of the fall 2004 examination session. For more information, contact Dr. David B. Kennedy, President, RCDC, 5075 Yonge Street, Suite 405, Toronto, ON M2N 6C6; tel.: (416) 512-6571; fax: (416) 512-6468; e-mail: office@rcdc.ca; Web site: www.rcdc.ca.

Appointments

CAOMS Elects New President

Dr. Joseph Friedlich

Dr. Joseph Friedlich is the new president of the Canadian Association of Oral and Maxillofacial Surgeons (CAOMS).

Dr. Friedlich is registered with the Royal College of Dental Surgeons of Ontario as a specialist in oral and maxillofacial surgery. He is a Fellow of the Royal College of Dentists of Canada (RCDC) and a Diplomate of the American Board of Oral and Maxillofacial Surgery. Dr. Friedlich maintains a specialty practice in Toronto and Brampton and teaches part-time at the University of Toronto. He is also an examiner for the RCDC.

Obituaries

Allen, Dr. Harvey A.: Dr. Allen of Winnipeg, Man., passed away on August 28. Dr. Allen served as president of the Manitoba Dental Association in 1963 and when his son, Dr. Leslie Allen, became president in 1985, it was the only time in Manitoba history that a father and son not only practised together but also were elected to MDA presidential status. Dr. Allen was a life member of CDA.

Boychuk, Dr. Gerald A.: Dr. Boychuk of St. Albert, Alb., passed away on July 12. Dr. Boychuk was a 1971 graduate of the University of Alberta.

Dumencu, Dr. David J.: A 1986 graduate of the University of Western Ontario, Dr. Dumencu of Milton, Ont., passed away on July 18.

Ellis, Dr. Keith: Dr. Ellis of Westlock, Alb., passed away on July 14. He was a 1977 graduate of the University of Alberta.

Ferguson, Dr. Winston: A 1937 graduate of the University of Toronto, Dr. Ferguson of Kitchener, Ont., passed away on August 4. He was a life member of CDA.

Henderson, Dr. Edward C.: A 1952 graduate of the University of Toronto, Dr. Henderson of Welland, Ont., passed away on June 30.

Leake, Dr. Lawson W.: Dr. Leake of Mississauga, Ont., passed away on July 18. Dr. Leake graduated from the University of Toronto's faculty of dentistry in 1934, but had to wait until he turned 21 to become licensed. He was a life member of CDA.

Lukacko, Dr. Peter: A 1962 graduate of the University of Toronto, Dr. Lukacko of Mississauga, Ont., passed away on June 30.

Ulinder, Dr. Ronald L.: Dr. Ulinder of Abbotsford, B.C., passed away on June 17. He was a 1972 graduate of the University of British Columbia.

Winters, Dr. Garry N.: A 1968 graduate of the University of Manitoba, Dr. Winters of Victoria, B.C., passed away on August 18.

For direct access to the Web sites mentioned in the News section, go to the October *JCDA* bookmarks at http://www.cda-adc.ca/jcda/vol-70/issue-9/index.html.

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2. Harris M, Hardie-Muncy D, *et al.*, Effectiveness of Johnson & Johnson REACH® Clean Burst™ vs. Oral-B® SATIN FLOSS™ in Reducing Plaque, Data on file, Johnson & Johnson Inc., 2003.

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C&B CEMENT	BISCO	None	B,C,IC,M,P	SC	Low	3-4.0	5-6.0	2	M-H	M-H	5.88	na
CALIBRA	DENTSPLY/ CAULK	PRIME & BOND NT/ SELF-CURE ACTIVATOR	B,C,IC,M,P,V	DC,LC,SC	Med, high	2.5	6.0	5	High	M-H	46.08	91%
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INTEGRACEM	PREMIER	INTEGRABOND	C,IC,M,P,A	DC,SC	Low	3.0	3.5	1	Med	L-M	37.81	88%
LINKMAX	GC AMERICA	LINKMAX SELF-ETCH PRIMER	C,IC,M	DC,SC	Low	3.5	6.5	2	High	M-H	47.22	ce
LUTE-IT!	PENTRON CLINICAL TECHNOLOGIES	BOND-1	C,IC	DC,LC	Low	1.5	4.0	9	M-H	M-H	5.66	97%
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RELYX UNICEM	3M ESPE	Self-adhesive	B,C,IC,M,P	DC,LC,SC	Med	2.0	5.0	5	Med	M-H	45.00	ce
RELYX VENEER	3M ESPE	ADPER SINGLE BOND	V	LC	Low	—	—	6	M-H	Med	6.76	98%
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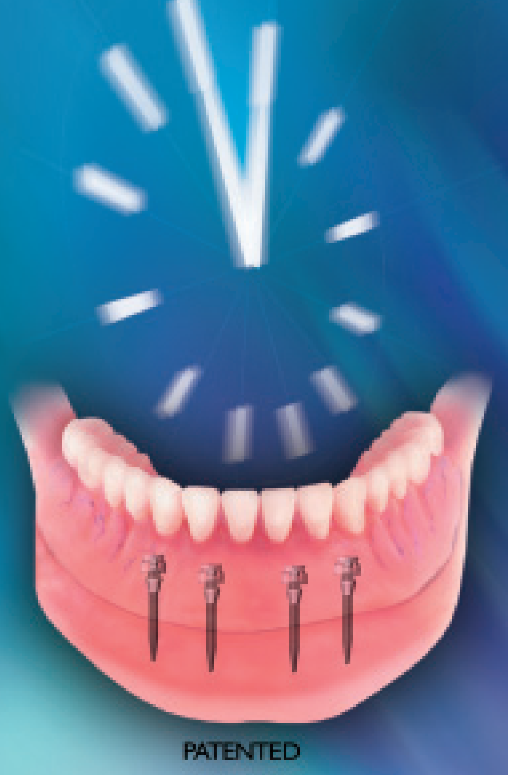

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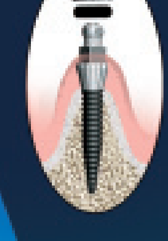

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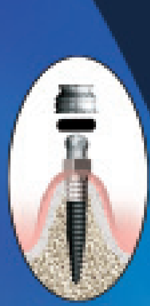

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Is Dentistry a Profession? Part 2. The Hallmarks of Professionalism

• **Jos V.M. Welie,** MMedS, JD, PhD •

Abstract

In this second in a series of 3 articles, the author builds on the definition of professionalism developed in the first article, arguing that the social contract between the profession and the public entails a collective responsibility of the members of the profession to serve the public good. Several specific professional duties are deduced, such as the duties to attain and maintain competence, to review one's peers, and to serve all in need of expert care. The third and final article will examine whether and to what extent dentistry fulfills these responsibilities and outlines some future challenges.

MeSH Key Words: *dental care/standards; dentist-patient relations; ethics, dental; professional practice/trends*

© J Can Dent Assoc 2004; 70(9):599–602
This article has been peer reviewed.

In the first article[1] in this series considering the status of dentistry as a profession, a profession was defined as "a collective of expert service providers who have jointly and publicly committed to always give priority to the existential needs and interests of the public they serve above their own and who in turn are trusted by the public to do so." This second article in the series discusses the moral obligations that arise when a certain career is considered a profession and its practitioners "professionals."

Collective Responsibility

The definition of a profession developed in the previous article in this series[1] (quoted above) includes 2 related terms that have yet to be analyzed: "collective" and "jointly." Many individual expert service providers are committed to serving others and may even have promised publicly to do so. But the social phenomenon of a profession always refers to a collective. It does not make sense to claim the status of a professional if there is no profession to which one can belong. Indeed, society's trust in professionals is not vested in the individual service providers but in the profession at large.[2] For example, patients trust their physicians because they are members of the profession of medicine. Even before becoming acquainted with a physician, the patient can trust the physician because he or she is a member of the medical profession. It may happen of course that the physician turns out to behave unprofessionally, for example, by selling the patient medical services that are not really needed. This can shake the patient's trust in the medical profession. But as long as this physician remains the exception to the rule and, if found out, is promptly defrocked by the profession, the trust that the patient vests in physicians can be maintained.

In contrast, car buyers do not expect car dealers to behave altruistically. If one such salesperson happens to do so, the buyer will be appreciative, but will not expect the same behaviour of the next car dealer he or she encounters. Conversely, if the buyer regrets being swayed by a car dealer into buying a more expensive car than originally planned, the blame rests solely with the buyer. The car dealer who manages to talk clients into buying the most expensive cars is not behaving "unprofessionally," because there is no profession of car dealers that has professed to always give priority to the driving needs of car buyers over and above the business interests of car dealers.

A Public Good

The profession's profession to be jointly committed to the interests of those it serves is directed at the public at large, not at individual patients or clients. Thus, a social contract arises between the collective of expert service providers and the public at large. After all, why would the public enter into such a contract if the promise to behave altruistically, that is, to collectively give priority to the existential needs of others, holds true only for that part of the

public that the service providers elect to assist? Hence, the collective of expert service providers in the dental profession is jointly responsible to relieve the needs of *all* people with dental problems, not just the patients that each individual dentist elects to treat. Each individual dentist shares in this collective responsibility.

This responsibility may strike many an individual care giver as excessive. Surely each dentist is not responsible for the needs of *all* dental patients but rather only those of his or her "own" patients. Indeed, health care providers are frequently confronted with situations in which the duty to one's own patients appears to take precedence over the interests of other patients. For example, the duty to protect an individual patient's confidentiality can properly be phrased in terms of the *individual* patient's *right* to confidentiality. However, this right to confidentiality is actually a vital *public* good. For if patients in general cannot trust that their private information will be treated confidentially, they will stop visiting health care providers. Thus, maintaining the confidentiality of a single AIDS patient who appears to be endangering others through unprotected sexual contact may harm those third persons in the short run but is actually in their own interests in the long run. If they, or any other members of the public, acquire AIDS, they must be able to entrust private information to their own care givers. Public trust in the profession is essential if the social contract between the profession and the public is to be sustained. In other words, trust trumps other competing interests.

We can therefore conclude that professions always serve a public good, that is to say, an interest that all members of the public share. This good need not be a communal good, necessarily and only enjoyed together. For example, one person's gold crown, unlike clean air or national safety, is not a benefit that society at large enjoys along with the patient. The same can be said for the legal defence of a terrorist. However, the assurance that each member of society — the terrorist or the person charged with a lesser crime — has the right to professional legal counsel to protect his or her basic human rights is a benefit that all of us hold in common. This argument applies analogously to such seemingly individual interests as health care and education. Although enjoyed first and foremost by the individual patient and student respectively, they are at the same time public goods because they are warp threads in the fabric of society. If they are cut, the fabric is likely to fray and disintegrate.

Specific Professional Responsibilities

As pointed out in the first article in this series,[1] professions are often defined in terms of seemingly arbitrary lists of responsibilities. However, on the basis of the foregoing analysis we are now in a position to deduce specific responsibilities. A profession has been defined in terms of its collective promise to apply its expertise — and hence power — for the good of the public and not to capitalize on the vulnerability of its patients or clients in an attempt to maximize its own interests. In turn, the public entrusts the task of relieving its existential needs to the profession, that is, the collective of service providers, and trusts that the profession will live up to this promise. The starting point for any professional ethic is therefore the obligation to be deserving of the trust that the public at large and each and every individual patient or client vests in the profession at large and in each and every member of the profession. What specific responsibilities can be deduced from this starting point? Without pretense of exhaustiveness, 3 categories of professional responsibilities can be distinguished.

Who Serves?

Competence of Providers

First, the profession must ensure that all of its members are competent to provide the services they have pledged to render. The exact levels of knowledge, skill and experience to be achieved can be determined only in the context of available human and financial resources, public needs and other such factors. The levels may differ by country and will certainly change over the course of history. The point here is that each professional must at least attain and maintain the set level in effect at the time and place he or she is practising.

Recall that the social contract requires competence to benefit all in need. For example, if children with learning disabilities are not given the necessary education because teachers are trained to educate only the ablest and brightest students, the collective of teachers is not living up to the standards of a genuine profession.

Peer Review

Because of the expertise required to provide needed services effectively, patients or clients are by definition unable to objectively assess the work of their professional service providers. The profession is thus required to assess itself, which means that individual professionals must be willing to review their peers and to submit themselves to peer review. Such peer review is not primarily intended to eradicate "rotten apples" or to appease disgruntled patients, but is undertaken to prevent such problems in the first place. Professionals are only human and can therefore be expected to make mistakes. On the other hand, each professional acquires tremendous practice experience in the course of his or her career from which peers can surely benefit.

Internal Discipline

Unfortunately, some apples will rot in spite of constructive peer review. One of the most unpleasant obligations of

professionals is to blow the whistle on peers who have harmed or are likely to harm their patients, so that the profession can protect the public from these members by revoking their licences. This is a painful process, but the profession's profession to collectively foster the interests of patients, even if doing so entails harm to the self, demands such internal disciplining. If the public suspects that the profession is actually closing instead of disciplining its ranks, it will conclude that the profession has breached the social contract.

Noncompetition

In spite of rigorous educational and licensing standards, there will always be differences in knowledge, skill and experience between different professionals. This is exactly why constructive peer review makes sense: peers have an opportunity to learn from peers. But these differences should not be exploited by professionals to boost their private interests, endangering the public's trust in the profession along the way. When professionals begin to publicly compete with one another, each advertising himself or herself as a better service provider than his or her peers, patients may infer that not all professionals are trustworthy or at least that not all of them are equally trustworthy.

> ***When professionals begin to publicly compete with one another, patients may infer that not all professionals are equally trustworthy.***

What Kind of Service Is Provided?

Services That Are Beneficial by Objective Standards

The profession's profession to serve the public and to do so well would be meaningless if there were no standard by which this service could be assessed. The standard cannot be purely subjective, for such a standard is no standard at all. An objective standard is needed by which to assess the services rendered. Although the ultimate goal — relieving the public's needs — can only be defined by listening carefully to those in need, only the profession can determine the best way to reach that goal. This is exactly what makes professionals powerful experts. Empirical science, statistical analysis, and, more recently, outcomes research can help the profession attain objectivity.

Standardization of Treatment

Nobody would disagree that all professionals must be competent. But competence does not necessarily translate into practice. Different professionals may have attained the same level of knowledge, skill and experience, yet they may approach the same problem differently with different results. The public will likely and understandably interpret such differences as a violation of the social contract. The profession is thus obligated to continuously assess different service modalities in terms of their effectiveness and efficiency and to develop treatment protocols. Only these approaches will ensure that patients and clients receive the same high-quality services regardless of which professional renders them.

Who Is Served?

Guarding Against Conflicts of Interest

If the primary objective of professional services is to foster the interests of those served, professionals must guard against conflicts between the interests of those they serve and some other set of interests. The most obvious of such conflicting interests are personal interests. Depending on the nature of the profession, different personal interests may be prominent. Within the military, the personal interest is life itself. For a physician it may be his or her own health. For all professionals who earn an income, that income becomes a conflict of interest. Depending on the reimbursement system, a health care professional may be tempted to overtreat (in a fee-for-service system) or to undertreat (in a capitated system). But as the American College of Dentists has rightly pointed out, regardless of the reimbursement system, this conflict of interest is inevitable whenever professionals generate income from their professional services.[3]

In addition to personal interests, professionals may be (and frequently are) pressured to give priority to the interests of other third parties over those of the patients or clients. For health care professionals, such competing third parties are biomedical researchers, educators, insurance companies, and legal authorities. Although these conflicts of interests cannot always be avoided, the profession and its members must always be on guard, must try to prevent them and, if inevitable, must acknowledge them publicly while seeking to minimize their impact.

Preventing Discrimination

The social contract requires that professionals not negatively discriminate by refusing to treat certain patients on the basis of factors unrelated to the service provided, such as sex, race, religion or nationality. Likewise, professionals should not positively discriminate by favouring certain patients. Indeed, patients should not have to worry about the possibility of negative or positive discrimination. Hence, professionals should not accept tips, gifts or other favours from patients, nor should they enter into romantic relationships with them. Even if the professional can resist the temptation to favour patients who bring gifts or "come on" to the professional, it is important that other patients do not think that they too have to bring gifts or

be amenable to romances in order to obtain prompt, optimal care.

Fostering Access

A profession professes (i.e., promises) to provide a service so as to relieve a serious need that renders each individual frail and vulnerable and that threatens the social fabric. Professionals do so without discriminating, either positively or negatively, so that all in need may benefit. However, this laudable objective may be frustrated and even undermined if those in need cannot access a professional service provider. The legal system of a country may be fair and just, and the attorneys operating the system may be genuine professionals, but if some citizens are prevented from accessing professional legal counsel, the system falters. Justice will not be served, individuals will be harmed, and the social fabric will be at risk. To the extent that the factors restricting access are caused by the profession itself, the profession is responsible and must strive to end them.

Conclusions

Once upon a time the professions were populated by aristocratic sons who had the misfortune of being born second or third in line. Unable to inherit the noble title and family estate, the next best option was to become a professional. Today, the professions continue to lure young people seeking social status and wealth. However, as the analysis in this article makes clear, being a professional is not, nor should it be, about privileges and rights. Through their voluntary commitment to serve the public, those joining a profession assume a variety of demanding duties and responsibilities. The next and final article in this series will examine how the profession of dentistry is living up to this ideal and will define the challenges that lie ahead. ❖

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The views expressed are those of the author and do not necessarily reflect the opinions or official policies of the Canadian Dental Association.

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A Macroeconomic Review of Dentistry in Canada in the 1990s

• **Kalyani K. Baldota,** BDS •
• **James L. Leake,** DDS, MSc, DDPH, FRCD(C) •

Abstract

Objectives: *To document the trends in expenditures on dental health care services and the number of dental health care professionals in Canada from 1990 to 1999.*

Methods: *Information on dental and health expenditures, numbers of dentists, hygienists and dental therapists, and the population of Canada and the provinces were obtained from the Canadian Institute for Health Information; data on numbers of denturists were obtained from regional bodies and from Health Canada. Information on the costs of other disease categories was taken from studies by Health Canada (1993 and 1998). International comparisons were made on the basis of data published by the Organisation for Economic Co-operation and Development (OECD). Indices of change over the decade (in which the 1990 value served as the baseline [100]) were calculated.*

Results: *By 1999, the supply of all types of dental care providers had increased to 1 for every 904 people. Dental expenditures during the 1990s increased by 64% overall and by 49% per capita, a rate of increase that exceeded both inflation and costs of health care. Although the public share of dental costs decreased from 9.2% to 5.8%, the direct costs of dental care increased to rank second ($6.30 billion) after those for cardiovascular diseases ($6.82 billion). Among the OECD nations, Canada had the fourth highest per capita dental expenditures and the second lowest per capita public dental expenditures.*

Conclusions: *The direct economic costs of dental conditions increased during the 1990s from $4.13 billion to $6.77 billion. Over the same period, the public share for expenditures on dental health care services declined.*

MeSH Key Words: *Canada; dental care/economics; health expenditures*

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According to Merriam Webster, macroeconomics is the study of the economics of whole systems, especially with reference to general levels of output and income and to the interrelations among sectors of the economy. This review sets out to provide information on the resources used in the dental health care sector in Canada during the decade ending in 1999.

In Canada, dental health care services are largely excluded from the publicly administered, universal health care system, and most remain privately financed and privately delivered. As such, the economics of the dental health care sector is often not described adequately in the public reporting of the costs of Canada's health care services. Consequently, the profession, society and health planners in government may not appreciate the economic burden of illness attributable to dental diseases. Given the increasing evidence that oral health is an important component of general health,[1] an understanding of the resources used in providing dental health care is critical to understanding the relative importance of the oral health care system and to determining future oral health care policy.

This review follows 2 similar reviews, the first covering the period from 1960 to 1980[2] and the second covering the 1980s.[3] This paper describes trends in the supply of dental care service providers and their distribution, as well as dental care utilization in terms of expenditures, over a period of 10 years, from 1990 to 1999. Canadian dental health care expenditures are compared with those for other health care sectors in Canada and with those of other developed countries.

Methods

The Canadian Institute for Health Information (CIHI) has maintained health care information for Canada since 1994. CIHI provides health data to qualifying graduate students through the Graduate Student Data Access Program. Through this program, CIHI provided the authors with information for the years 1990 to 1999 on the following topics: total health care expenditures; total, private, public and per capita dental health care expenditures; numbers of licensed dentists, dental hygienists and certified dental specialists; and the population of Canada and its provinces and territories. Numbers of denturists were obtained from several sources, specifically, through direct requests to the licensing bodies in each jurisdiction and, where no response to such a request was received, a separate report on national association membership in 2003 (personal communication between JL and provincial denturist licensing bodies and associations). Numbers of dental therapists were obtained directly from the First Nations and Inuit Health Branch of Health Canada (personal communication between JL and the First Nations and Inuit Health Branch, July 2003). CIHI does not maintain data on dental assistants or dental technologists, and obtaining this information was beyond the scope of this project. During the decade some of the definitions changed: in 1990 information on dentists related to active, licensed dentists who were working full- or part-time. For subsequent years, the CIHI numbers represent dentists and hygienists who were registered but may not have been working. Similarly, information on the numbers of denturists and dental therapists relates only to those who were registered, not necessarily those who were working.

CIHI data for health care spending are contained in the National Health Expenditures database. The information is extracted manually from diverse public documents, including national and provincial or territorial public accounts and other financial reports. Other sources include private insurance companies, A.C. Nielsen Canada and Statistics Canada. Most private sector expenditures are estimated from survey data. Before 1996, the Survey of Family Expenditures by Statistics Canada, an important source of private sector data, was not carried out annually (the surveys before 1996 were conducted in 1990 and 1992); therefore, trend data have been imputed by CIHI for years between surveys.[4] Expenditures on dental care are obtained mostly from the income tax files of dentists. Because the incomes of denturists and dental hygienists practising independently are not tracked by Statistics Canada, expenditures on their services may not be fully captured in the CIHI database. In addition, the direct hospital costs associated with dental care provided for, say, oral cancer patients or young children with early childhood caries are captured under hospital costs. Thus, the expenditures reported here understate the full costs of dental care.

Household expenditures and annual inflation rates were obtained from Statistics Canada.[5] Household expenditures are based on the Survey of Family Expenditures until 1996 and the Survey of Household Spending[6] after that. Values of the gross domestic product (GDP) for Canada were obtained from the Saskatchewan Bureau of Statistics.[7] For international comparisons, health data released by the Organisation for Economic Co-operation and Development (OECD)[8] were used.

Additional analyses were performed on the data from the above sources. Ratios of population to providers and indices of change (in which the 1990 value served as the baseline [100]) were calculated. Dental expenditures were compared with the national indicator of economic output, the GDP, and with total expenditures on health care.

Findings

The findings of this study must be considered against the background of economic and health expenditure changes in Canada. For example, from 1990 to 1999, the consumer price index increased by 18.4% and total health care expenditures rose by 47.1%.[5]

In the interest of brevity, the results for only 3 years are shown, for the start, middle and end of the decade under study. **Table 1** provides the numbers of licensed dentists and licensed dental hygienists in each province or territory and the whole of Canada, as well as the ratio of the population per professional for each category and indices of change in number of professionals.

The largest overall absolute increase (5,704) and rate of increase (65%) occurred among dental hygienists. This greatly exceeded the 18% increase in licensed dentists and the 10% increase in the population. The number of dentists increased in all provinces except Saskatchewan, and the number of hygienists increased in all jurisdictions. The national ratio of population per dentist fell from 1,943:1 in 1990 to 1,805:1 in 1999, which indicates an increase in the relative supply of dentists. Again, this change was dwarfed by the increase in the supply of dental hygienists. Combining both groups resulted in a population to dentist or hygienist ratio of 971:1 at the end of the decade. The increase in the relative supply of dentists and hygienists occurred in all provinces and territories.

Dental specialists are included in the data for dentists. The number of dental specialists increased by 18%, from 1,597 in 1990 to 1,884 in 1999; specialists represented a constant 10% of all dentists (detailed data not shown in table).

Dental therapists provide primary oral health care to First Nations and Inuit communities through the First Nations and Inuit Health Branch or local arrangements with Band councils. In Saskatchewan, therapists can also

Table 1 **Numbers of dentists and dental hygienists in Canada in the 1990s[a]**

	No. of dental professionals (and population per professional)								
	1990			1995			1999		
Province	**Dentist**	**DH[b]**	**Total**	**Dentist**	**DH[b]**	**Total**	**Dentist**	**DH[b]**	**Total**
B.C.	2,270 (1,471)	960 (3,478)	3,230 (1,034)	2,276 (1,685)	1,562 (2,593)	3,838 (999)	2,586 (1,557)	1,788 (2,252)	4,374 (920)
Alta.	1,363 (1,887)	830 (3,099)	2,193 (1,173)	1,476 (1,870)	1,046 (2,638)	2,522 (1,094)	1,588 (1,863)	1,251 (2,365)	2,839 (1,042)
Sask.	370 (2,709)	148 (6,773)	518 (1,935)	343 (2,963)	232 (4,384)	575 (1,768)	349 (2,938)	267 (3,840)	616 (1,664)
Man.	528 (2,095)	413 (2,679)	941 (1,175)	543 (2,082)	498 (2,271)	1,041 (1,086)	553 (2,066)	550 (2,077)	1,103 (1,036)
Ont.	5,781 (1,792)	3,857 (2,686)	9,638 (1,075)	6,323 (1,744)	5,170 (2,010)	11,493 (959)	6,911 (1,668)	6,322 (1,823)	13,233 (871)
Que.	3,134 (2,244)	2,100 (3,349)	5,234 (1,344)	3,707 (1,958)	2,951 (2,653)	6,658 (1,090)	3,922 (1,874)	3,565 (2,061)	7,487 (982)
N.B.	228 (3,260)	133 (5,588)	361 (2,059)	247 (3,046)	194 (3,878)	441 (1,706)	260 (2,905)	240 (3,147)	500 (1,511)
N.S.	420 (2,172)	317 (2,873)	737 (1,237)	431 (2,157)	374 (2,486)	805 (1,154)	441 (2,134)	420 (2,241)	861 (1,093)
P.E.I.	49 (2,663)	23 (5,673)	72 (1,812)	48 (2,826)	30 (4,518)	78 (1,739)	57 (2,416)	38 (3,624)	95 (1,450)
Nfld.	146 (3,960)	37 (15,248)	183 (3,159)	144 (3,919)	54 (10,511)	198 (2,850)	158 (3,423)	69 (7,838)	227 (2,382)
Y.T.	16 (1,760)	14 (6,276)	66 (1,331)	9 (3,499)	22 (4,475)	82 (1,206)	16 (1,940)	26 (1,694)	100 (440)
N.W.T.	36 (1,659)			51 (1,313)			58 (706)		
Total for Canada	**14,341 (1,943)**	**8,832 (3,155)**	**23,173 (1,191)**	**15,598 (1,892)**	**12,133 (2,432)**	**27,731 (1,058)**	**16,899 (1,805)**	**14,536 (2,099)**	**31,435 (971)**
Index of change for Canada[a]	100	100	100	108	137	120	118	165	136
Population of Canada		27,700,860			29,353,850			30,509,320	
Index of population change[a]		100			106			110	

Source: Canadian Institute for Health Information, through Graduate Student Data Access Program.
[a]Calculated as (1990 or 1995 or 1999 value/1990 value) × 100.
[b]Numbers of dental hygienists for 1999 were taken from the preliminary release of Health Personnel Trends in Canada, 1993–2002.[14]

work for private dentists and most (188) work in that setting. Their numbers were relatively constant over the decade, totalling 240 in all of Canada in 1999. The information obtained for denturists was inconsistent for the period under review, and the authors' best estimate is that there were 1,925 denturists at the start of the decade and 2,075 at its close. Denturists were registered in every province and territory but, by 1999, most were located in Quebec (939), Ontario (459) and Alberta (234). If the numbers of dental therapists and denturists are added to the 1999 figures for dentists and hygienists, the national total rises to 33,750 providers, the index of total providers increases to 133, and the final ratio of population to providers becomes 904:1.

As defined by CIHI, dental expenditures are the professional fees of dentists (including care provided by dental assistants and hygienists) and denturists, as well as the cost of dental prostheses (including dentures and laboratory charges for crowns and other dental appliances).[4] **Table 2** presents the expenditures on dental services in total and relative to other economic measures. Over the decade, dental expenditures increased from $4.13 billion to $6.77 billion, a 64% increase. Dental expenditures as a proportion of the GDP increased from 0.61% to 0.69%; as a percentage of total health care costs, they rose from 6.8% to 7.6% by 1996 but then fell slightly to 7.5% in 1999.

The proportion of total dental expenditures that was paid privately increased from 90.8% ($3.7 billion) in 1990 to 94.1% ($6.4 billion) in 1999. At the same time, the privately insured fraction of total private expenditures rose only slightly, from 53.2% to 55.0% (index of change 103), an increase in the actual amount (not shown in the table) from $2.0 billion in 1990 to $3.5 billion in 1999. Per capita dental expenditures increased from $149.42 in 1990 to $222.03 in 1999.

The proportion of total expenditures for dental health care services paid by public funds was highest in the Northwest Territories, Yukon Territory and Nunavut (44% to 65%) and lowest in Ontario (2%) (**Table 3**). For

Table 2 **Expenditures for dental health care services in Canada in the 1990s in relation to gross domestic product (GDP), total health care expenditures and private health care expenditures**

Year	Total dental expenditures ($ billion)	% of GDP	% of total health care expenditures	Private expenditures ($ billion and % of total)	% of private expenditures insured	Per capita expenditures ($)
1990	4.13	0.61	6.8	3.7 (90.8)	53.2	149.42
1991	4.46	0.63	6.7	4.0 (90.9)	55.7	159.38
1992	4.69	0.66	6.7	4.3 (91.1)	57.1	165.29
1993	4.92	0.67	6.9	4.5 (91.4)	56.5	171.65
1994	5.21	0.68	7.1	4.8 (91.6)	55.2	179.65
1995	5.48	0.68	7.4	5.1 (92.2)	54.9	186.86
1996	5.66	0.68	7.6	5.3 (93.1)	54.8	190.87
1997	5.89	0.67	7.5	5.5 (93.5)	55.6	196.64
1998	6.27	0.69	7.5	5.9 (94.1)	57.2	207.59
1999	6.77	0.69	7.5	6.4 (94.1)	55.0	222.03
Index of change (1990 = 100)[a]	**164**	**113**	**111**	**170**	**103**	**149**

[a]*Calculated as (1999 value/1990 value) × 100, on the basis of non-rounded data.*

Table 3 **Total expenditures for dental care in Canada in the 1990s and proportion paid through public funds**

	1990		1995		1999	
Province	**$ million**	**% public**	**$ million**	**% public**	**$ million**	**% public**
B.C.	644.5	6.9	875.6	7.9	1099.3	6.0
Alta.	476.8	18.6	567.9	10.1	739.0	8.5
Sask.	109.2	22.1	140.8	18.7	142.4	17.5
Man.	155.9	11.8	199.2	14.7	216.3	11.5
Ont.	1,741.6	2.0	2,410.5	2.1	2,927.8	1.6
Que.	770.0	16.7	981.7	15.4	1,287.7	10.2
N.B.	65.2	8.6	83.6	8.1	105.0	6.2
N.S.	106.2	17.2	129.9	11.4	153.6	9.2
P.E.I.	15.2	15.1	22.3	10.3	21.3	11.8
Nfld.	40.2	21.9	55.9	12.8	59.0	11.5
Y.T.	2.6	54.8	5.1	46.0	6.9	44.1
N.W.T.	11.2	47.8	13.1	54.7	12.0	56.9
Nun.	—	—	—	—	3.6	64.6
Total for Canada[a]	**4,138.9**	**9.2**	**5,485**	**7.7**	**6,773.9**	**5.8**

[a]*Total may differ from the sum of provincial values because of rounding.*

the country as a whole, the proportion of expenditures paid by public sources declined steadily, from 9.2% in 1990 to 5.8% in 1999. This decreasing trend in the public contribution to total dental expenditures was observed for all provinces and territories except the Northwest Territories, where the public share increased from 48% to 57%, and in Ontario, where it remained constant.

Per capita expenditures for dental health care services in Canada increased by 49%, and the trend to higher per capita expenditures was observed in every province and territory except Saskatchewan (**Table 4**). The greatest per capita increase occurred in the Yukon (153%). Among the provinces, the greatest increase occurred in Quebec (61%); in contrast, Saskatchewan had a reduction to 70% of the 1990 levels.

Estimates of direct (out-of-pocket) expenses for dental health care (excluding expenses covered by insurance) were collected as part of the Survey for Family Expenditure (for 1990, 1992 and 1996) and the annual Survey of Household Spending (annually from 1997).[7] Mean direct dental expenses increased from $183 to $214 per family between 1990 and 1999. However, as a proportion of all out-of-pocket family health care expenditures, they decreased from 33% in 1990 to 25% in 1999, a finding consistent with families experiencing increases in out-of-pocket nondental health care expenses over the decade.

Table 4 Mean per capita expenditures for dental care in Canada in the 1990s

Province	Per capita expenditure ($) 1990	1995	1999	Index of change (1990 = 100)[a]
B.C.	195	231	272	139
Alta.	187	207	249	133
Sask.	198	138	138	70
Man.	141	176	189	134
Ont.	169	219	253	150
Que.	109	135	175	161
N.B.	88	111	138	157
N.S.	116	142	163	141
P.E.I.	116	165	154	133
Nfld.	69	97	109	158
Y.T.	92	164	233	253
N.W.T.	190	196	293	154
Nun.	—	—	131	—
Overall for Canada	**149**	**186**	**222**	**149**

[a]Calculated as (1999 value/1990 value) × 100.

Table 5 Direct costs of illness in Canada by diagnostic category in 1993 and 1998

Disease category	Cost of illness ($ billion) 1993[9]	Cost of illness ($ billion) 1998[10]	Rank 1993	Rank 1998
Cardiovascular disorders	7.35	6.82	1	1
Dental disorders[11]	4.93	6.30	3	2
Mental disorders	5.05	4.68	2	3
Digestive disorders	3.79	3.54	4	4
Respiratory disorders	3.33	3.46	5	5
Injuries	3.22	3.22	6	6
Cancer	3.12	2.46	7	7

Table 5 compares the direct economic costs of dental health care to the costs of other disease categories based on studies by Health Canada.[9,10] The direct costs of illness are defined as the value of goods and services for which payment was made and resources used in treatment, care and rehabilitation.[10] Indirect costs, which are not included here, are defined as the value of economic output lost because of illness, injury-related work disability or premature death.[10] In 1993, the direct cost for care of dental conditions ($4.93 billion) ranked third after cardiovascular diseases ($7.35 billion) and mental disorders ($5.05 billion) and was higher than those for cancer, respiratory diseases, digestive diseases and injuries. In 1998, the costs of dental care ($6.30 billion) surpassed those for mental disorders ($4.68 billion) and rose to second position after those for cardiovascular diseases ($6.82 billion).

In terms of total per capita health care expenditures, Canada ranked third in 1998 among the OECD nations, after the United States and Germany. With respect to total per capita dental health care expenditures, Canada ranked fifth, after Germany, Japan, Switzerland and the United States. However, the public share of per capita dental expenditures in Canada was second lowest (greater only than the United States); in this regard, Germany ranked highest, followed by Japan.[8,11]

Discussion

The trend to increases in human resources and expenditures for dental health care, observed since 1960,[2,3] continued during the 1990s. The increase in the number of dental care service providers has so surpassed the rate of population growth that by 1999 there was one dental health care provider for every 904 people in the country. Relative to 1990, the index of expenditures on dental health care services in 1999 (164) exceeded that of the increase in the population (110), the consumer price index (118) and the effects of these 2 factors combined (about 130). Over the decade, dental health care made up an increasing share of total health care expenditures (index of change 111), although the latter also increased greatly (index of change 147). By 1999, dental care expenditures made up 0.69% of the country's GDP, an increase of 13%. The trend to less public funding of dental care, already evident in the 1980s,[2] continued, so that by 1999 less than 6% of costs were publicly financed.

Even with the understatement of direct costs for dental care inherent to this analysis, expenditures on dental care rose from third position in 1993 to second in 1998 relative to the costs of other diseases. In 1998, they were second only to expenditures on cardiovascular diseases.

New to this review are the OECD comparisons. Although different countries may have different definitions of what is included in their health care accounts, it appears that Canada ranks fourth in total per capita health care expenditures and in total per capita dental expenditures, following Germany, Switzerland and the United States. However, in terms of public per capita dental expenditures, Canada ranks next to last.

This review had several limitations. It is a secondary analysis of data provided by CIHI and other sources and is subject to the quality of the data provided. The estimates reported here likely underestimate the true costs because they may omit costs of dental services rendered in hospitals and because of the problems in identifying the practice revenues of denturists. Differences in the quality of data may be particularly problematic for the OECD comparisons, where consistency among nations in the definitions and assembly of data could not be assured. Nonetheless, the review is consistent with the methods used for the 2 previous reports,[2,3] and the findings should have the same quality as findings in those publications. In addition, because the smallest unit of analysis was the province or territory, more detailed analysis (e.g., by population group or by urban and rural areas) was not possible.

Consistent with the 2 previous reviews,[2,3] the types and distribution of dental health care services provided to Canadians and the health outcomes produced by these extensive human and financial resources cannot be reported. Although these findings indicate that Canadians are spending more on dental health care than ever before and although others[12] have shown that oral health appears to be improving, questions about the extent to which those Canadians most in need of services have access to oral health care and the effectiveness and efficiency of the system remain unexamined. These issues and others were not addressed in the most recent review[13] of health care policy in Canada. ♦

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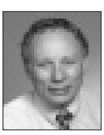

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Necrotizing Fasciitis of the Face: A Rare but Dangerous Complication of Dental Infection

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Abstract

Necrotizing fasciitis of the face is extremely rare. However, dentists should be familiar with the presentation of this condition because of the suddenness of its onset, the rapidity of its spread, the resulting drastically disfiguring morbidity and the high rate of mortality associated with it. In this paper, we describe the presentation and treatment of a 57-year-old woman with necrotizing fasciitis of the face and neck due to dental causes and discuss factors in the management of this life-threatening condition.

MeSH Key Words: *abscess complications; face; fasciitis, necrotizing/therapy; tooth diseases/complications*

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Necrotizing fasciitis (NF) is a rapidly spreading infection involving the superficial fat and fascial layers with necrosis of the overlying skin. The lesion was first described during the American Civil War[1] and has been reported extensively in the general surgery literature. It is most common in the perineum, abdominal wall and extremities and is most often seen in the elderly and in immunocompromised patients.[2] NF is less common in the head and neck, especially in the face. In their review, Shindo and others[3] found only 35 reports of facial NF.

This infection can result from dental,[4–6] sinus,[7] peritonsillar[8,9] and salivary gland[10] infections or infections secondary to surgery[11] or trauma.[3] The causative agents have classically been described as group A beta-hemolytic streptococci and staphylococci and also include obligate anaerobic bacteria.[5,12]

If not promptly recognized and treated, NF may spread into the deep spaces of the neck and compromise the airway; it may also spread into the mediastinum producing life-threatening sepsis.

In this report, we describe the presentation and treatment of facial NF in a 57-year-old woman and discuss management considerations.

Case Report

The oral and maxillofacial surgery service at Mount Sinai Hospital was consulted regarding a 57-year-old woman with a 5-day history of right-side facial swelling, trismus and pain. She had been seen previously by a dentist who prescribed amoxicillin but, because of lack of compliance with treatment, her symptoms continued to worsen. A review of her medical history revealed severe depression and an anxiety disorder, and her medications included an anti-depressant and a high-dose benzodiazepine. Clinical and radiographic examination revealed a moderate right buccal space infection with right submandibular involvement secondary to grossly decayed teeth 46 and 47. The parapharyngeal spaces were clear and there was no airway compromise. The patient was admitted for intravenous antibiotics, observation and analgesia. Unfortunately, on the night of her admission, she pulled out her intravenous catheter and discharged herself from the hospital against medical advice. Multiple attempts to contact her were unsuccessful.

Five days later, she returned to the emergency department with marked deterioration. She appeared toxic, was febrile and tachycardic. A large necrotic region on her right cheek extended from the zygomatic arch to below the

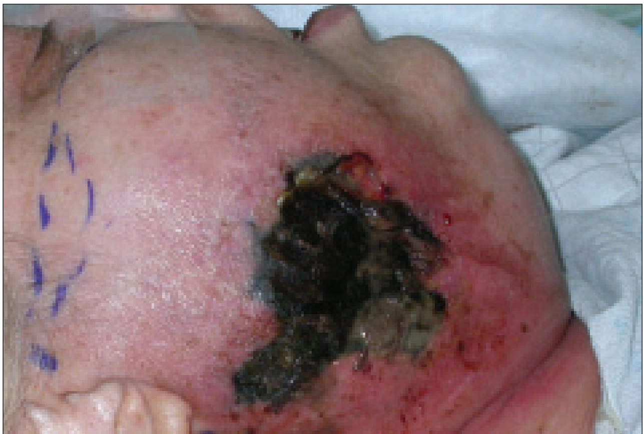


Figure 1: *Patient with full-thickness necrosis of the cheek and initial extensive bullae and erythema from the zygomatic arch to the inferior border of the mandible.*

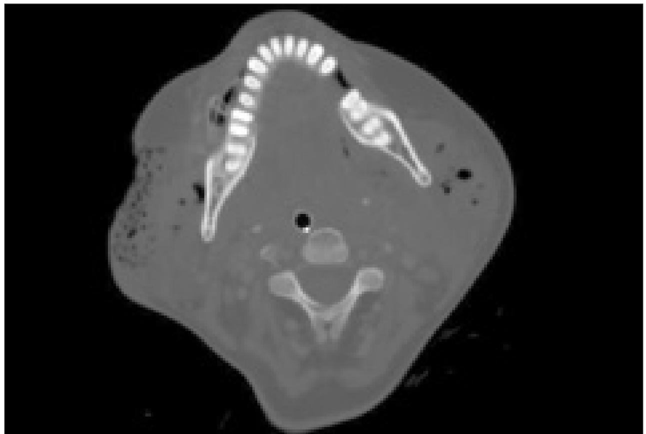


Figure 2: *Preoperative CT scan showing marked edema and extensive subcutaneous gas formation, which is also present in the parotid gland bilaterally.*

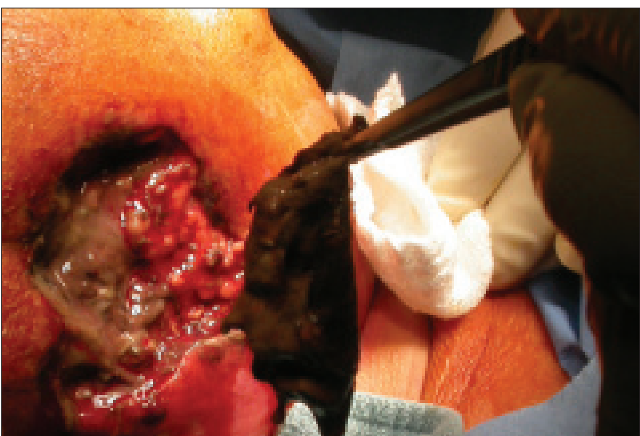


Figure 3: *Necrotic tissue being excised from the wound. The margins of the excision had to be extended several times as the lesion continued to spread intraoperatively.*

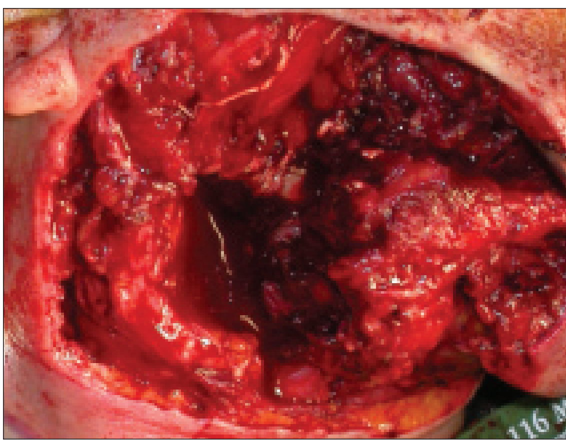


Figure 4: *Postoperative defect after extensive resection of all necrotic tissues.*

mandible (**Fig. 1**). There was severe right temporal, bilateral submandibular, cervical and floor of the mouth swelling.

The skin appeared grossly abnormal; a spectrum of findings ranged from erythema, patchy areas of bullae to frank necrosis. Marked crepitus was noted from the zygomatic region to the laryngeal cartilages in the neck. The patient was taken to the operating room for immediate endotracheal intubation, which was performed uneventfully. A tracheostomy was considered but was not performed due to the degree of paratracheal swelling. After the airway was secure, an emergent computed tomography (CT) scan revealed the presence of severe subcutaneous gas formation and marked generalized head and neck edema (**Fig. 2**).

The patient was taken to the operating room where immediate complete debridement of all necrotic tissue was performed until bleeding tissue was encountered. The areas of debridement had to be extended throughout the operation as the zones of involvement and necrosis were seen to extend and increase during the surgery (**Figs. 3** and **4**). Clindamycin (900 mg intravenously every 8 h) was started following an intraoperative infectious disease consultation. Exploration and decompression of all involved fascial spaces was also completed, and teeth 46 and 47 were extracted. Multiple tissue samples were sent for culture, which later revealed the presence of a mixed infection, including *Streptococcus milleri*, coagulase negative *Staphylococcus* and anaerobic Gram-negative bacilli. The wound was packed with iodine gauze (**Fig. 5**). Intraoperatively, the patient exhibited signs of septic shock with hemodynamic instability requiring inotropic agents to maintain her blood pressure. She was transferred to the intensive care unit (ICU) and remained intubated.

The patient remained in the ICU for approximately 2 weeks. During the initial period in the ICU, hyperbaric oxygen treatment (HBOT) was administered 6 times. Wound care in the form of frequently changed poviodine-soaked gauze and further debridement of necrotic tissue was carried out. On one occasion, the patient was taken to the operating room for further debridement and partial

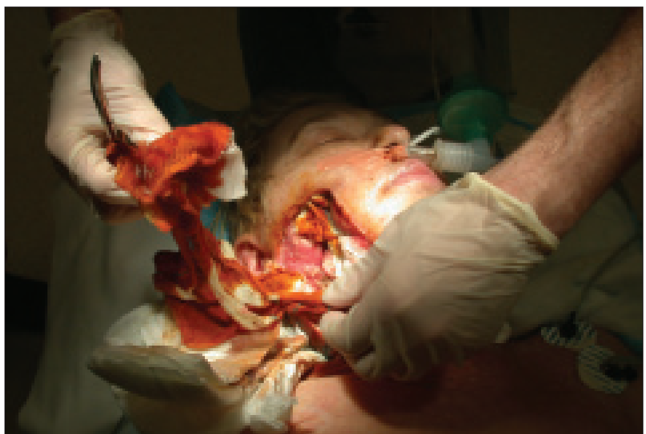


Figure 5: *Wound management with poviodine-soaked gauze dressings.*

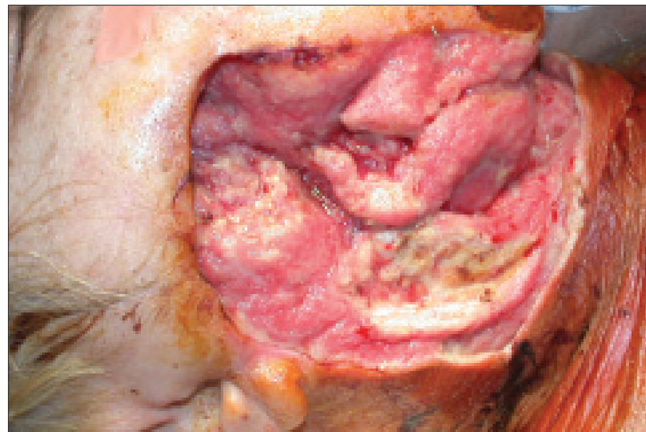


Figure 6: *The appearance of fresh granulation tissue heralds improvement of the wound and its readiness for skin grafting.*

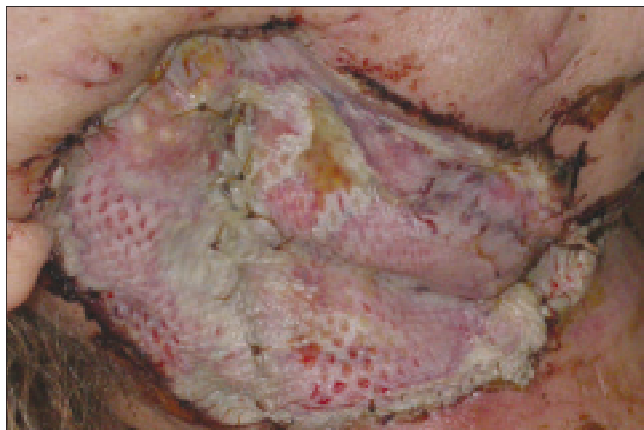


Figure 7: *Split-thickness skin grafts with perforations placed over the resection defect.*

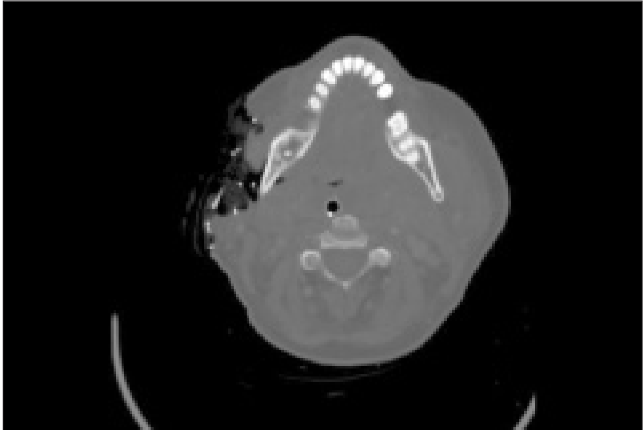


Figure 8: *Postoperative CT scan showing resolution of the infection and the defect of the right face by resection of the necrotic tissue.*

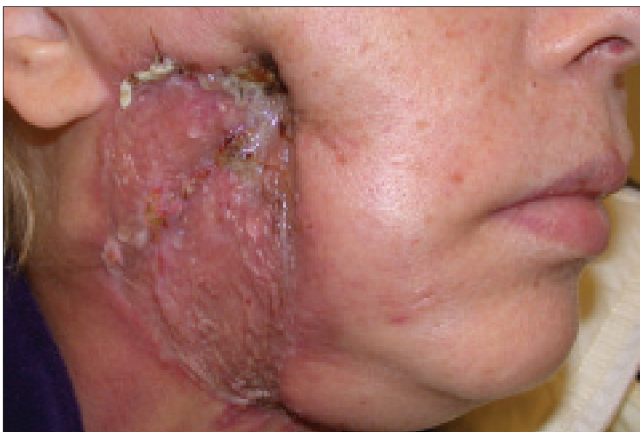


Figure 9: *Healed skin grafts 4 weeks after resection.*

decortication of the now-exposed surfaces of the mandible and zygoma. The mandible was covered using a split sternocleidomastoid muscle flap, and all teeth with questionable prognosis were extracted.

At a later date, when the wound bed was judged to be adequate (**Fig. 6**), multiple strips of split-thickness skin grafts were taken from the lateral thigh and grafted to the exposed areas to provide primary cutaneous coverage over the large exposed area left by the surgical debridements (**Fig. 7**). Definitive cosmetic treatment was delayed until the patient's comorbid conditions, including her psychiatric status, were stabilized.

During the next 2 weeks, the patient continued to improve slowly, both hemodynamically and clinically, although her postoperative recovery was complicated by a case of hospital-acquired pneumonia and an initial period of poor oral feeding due to fatigue and poor masticatory muscle coordination. Her pneumonia responded well to antibiotic treatment and a percutaneous gastric tube was used initially for nutrition. Throughout her stay, she continued to be followed by the infectious disease and psychiatry teams. Repeat examinations by serial CT scan revealed improvements in the involved fascial spaces (**Fig. 8**). Laboratory values continued to normalize and the patient remained afebrile. She was discharged to a local rehabilitation hospital in stable condition.

At 4 weeks follow-up, the patient remained asymptomatic, skin coverage over her large wound was excellent (**Fig. 9**) and oral food intake was good. Definitive treatment

to provide bulk and improved cosmesis, in the form of further rotational or free vascularized flaps, will be considered.

Discussion

NF of the head and neck is a rare but potentially fatal disease that all dentists should be aware of[4] as prompt diagnosis and recognition are the first and most important steps in its management. A delay in diagnosis could result in further disastrous morbidity.[4,5]

The infection involves the superficial fascial planes of the head and neck, i.e., the superficial musculoaponeurotic system, which envelopes the muscles that determine facial expression and extends from the frontalis muscle inferiorly to the platysma muscle and from the nasolabial fold posteriorly to the sternocleidomastoid muscle. In the initial stages before necrosis is seen, the infection spreads in the subcutaneous tissues and may appear as a routine dental infection.[5] Initially, the overlying skin surface is smooth, tense, shiny and inflamed. As the disease progresses, the overlying skin becomes dusky and blisters or bullae eventually form.[12] The underlying subcutaneous destruction creates an ideal culture medium for bacterial growth, and the skin later becomes gangrenous and necrotic secondary to thrombosis of the perforating dermal vessels.

The clinician must maintain a high index of suspicion with any patient presenting with a rapidly spreading, swelling erythema and fever, and palpate the wound to check for crepitus, which might indicate subcutaneous gas production. The absence of crepitus does not rule out gas formation, as this may be deep and inaccessible to clinical examination.[12] The first clinician to see the patient should mark the extent of the borders or periphery of the suspected tissue involvement with a felt pen so that the progression of the disease can be monitored later by the team who takes over the care of the patient. This will help the clinicians judge the degree and rapidity of the spread of the infection. The diagnosis of NF of the head and neck is often a clinical one; however, in the early stages a timely CT examination may reveal soft tissue gases in the neck. A CT scan is also helpful in rapidly determining the extent of the infection and the anatomic structures involved, and in identifying vascular thrombosis or vessel erosion.[12,13]

Laboratory findings can include leukocytosis or leukopenia and hypocalcemia secondary to the deposition of calcium in necrotic tissues.[1] Blood and wound cultures should be obtained, but treatment must be initiated before obtaining the results.

Once the diagnosis is made, treatment must not be delayed. Regarding NF of odontogenic origin, Stoykewych, Beecroft and Cogan[4] found 4 factors that contribute significantly to morbidity and mortality: delayed treatment due to difficulty in recognizing the condition; inappropriate treatment; host debilitation; and the presence of a polymicrobial infection. In the series reported by Umeda and others,[5] 3 clinical factors were found to affect mortality: a delay in surgery; the development of mediastinitis; and the presence of medical comorbidities. The cornerstone of treatment is surgical debridement. All necrotic tissue must be removed until healthy bleeding tissue is encountered. Reluctance to debride facial soft tissues aggressively and avoid unsightly disfigurement often leads to undertreatment of the disease early in its course.[3] Multiple surgical debridements in the operating room are usually needed.[14]

After surgical debridement, wounds are left open and packed with poviodine-moistened gauze,[15] which is changed frequently. It is important to prevent pooling of secretions in the wound that may provide a culture medium for further bacterial growth.

Along with debridement, appropriate antibiotic coverage is imperative. Classically, the organisms described in NF are group A beta-hemolytic *Streptococcus* and *Staphylococcus*; however, improved culture techniques have isolated a broader spectrum of microbes including obligate anaerobes. Odontogenic infections are often polymicrobial; initial therapy for NF could include broad-spectrum coverage and often more than one antibiotic is necessary.[5,6] The initial antibiotics may include a penicillinase-resistant penicillin for streptococcal and staphyloccal bacteria, an aminoglycoside for Gram-negative bacteria and clindamycin or metronidazole for anaerobic organisms. The coverage can be narrowed when culture results are available.

Even with adequate surgical debridement and intravenous antibiotic therapy, the mortality rate associated with NF is 20% to 40%.[16] Umeda and others'[5] review of NF of odontogenic origin revealed a mortality rate of 19.2%. Various adjunctive therapies have been tried to improve outcomes. Two that should be considered are HBOT and intravenous immunoglobulins G (IVIGG).

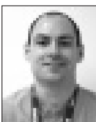
A number of studies[17,18] have suggested that the outcome for patients with NF may be improved by HBOT, but not all have shown benefits.[19] In the treatment of NF, IVIGG can neutralize superantigens and downregulate the production of tumour necrosis factor. The use of IVIGG in NF was first reported in 1994[20] and Skitarelic and others[21] were the first to describe their use in a case of head and neck NF. IVIGG have not been as extensively studied as HBOT and future clinical trials will be needed to determine their efficacy.

Once the infection has been resolved, the defect can initially be covered with a split-thickness skin graft and reconstructed secondarily by advancement flaps or vascularized free flaps if necessary.

Conclusions

In this report, we reviewed the history, clinical and radiographic presentation of a 57-year-old woman with NF of the face and discussed diagnostic and management

considerations. NF should always be considered in the diagnosis of cellulitic infection of the head and neck, including infections of dental origin. NF is associated with a high rate of morbidity and mortality. A delay in treatment due to difficulty in recognizing the condition may result in a disastrous outcome. ◆



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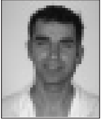

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The authors have no declared financial interests.

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Oral Kaposi's Sarcoma in a Renal Transplant Patient: Case Report and Literature Review

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• **Ivor Thompson,** BChD, BChD (Hons), MChD, PhD •
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Abstract

Malignancies, including oral Kaposi's sarcoma, may develop in transplant patients as a result of immunosuppressive therapy. Both the prevalence and the incidence of these malignancies vary. This article describes a renal transplant patient who was receiving immunosuppressive therapy and presented with oral Kaposi's sarcoma. The lesion was excised and did not recur. However, the patient died as a result of viral pneumonitis, secondary to her renal problems. The article also includes a review of the literature, with particular emphasis on oral presentation of immunosuppression-related malignancies.

MeSH Key Words: *immunosuppressive agents/adverse effects; kidney transplantation/immunology; sarcoma, Kaposi/etiology*

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The development of iatrogenic malignancies in organ transplant recipients has been well documented. Oral Kaposi's sarcoma in HIV-positive and AIDS patients has received much attention in the literature in recent years,[1] whereas iatrogenic Kaposi's sarcoma presenting in the oral cavity has not been recorded as thoroughly. The latter form may occur in organ transplant patients, months or years after the transplant.[2,3] The frequency of malignant lesions in renal transplant patients is between 14 and 500 times higher than in the general population, and these lesions occur at a younger age in renal transplant recipients than in the general population.[4] The prevalence of all malignancies in renal transplant patients ranges from 4% to 18% (average 6%),[5] and the incidence rises with each year after transplantation. Malignant tumours appear a mean of 61 months after renal transplantation; for Kaposi's sarcoma the mean period is 20 months.[6]

This article describes the occurrence of oral Kaposi's sarcoma in a renal transplant patient who was receiving immunosuppressive therapy. The literature is also reviewed, with particular reference to iatrogenic oral mucosal presentation in organ transplant patients.

Case Report

A 49-year-old woman who had undergone renal transplantation 1 year previously presented with a flat purple lesion 8 mm in diameter on her hard palate. She reported that the lesion had been present for 2 months. Further examination confirmed that no similar lesions were present on her skin. Subsequent to the transplant she had started an immunosuppressive drug regimen that was administered orally: cyclosporine 150 mg twice daily along with prednisone 15 mg per day and azathioprine 50 mg per day.

The palatal lesion (an example of which, from another patient, is shown in **Fig. 1**) was excised and examined microscopically. The histological sections revealed a vascular proliferation composed predominantly of small slit-like blood vessels and a proliferation of endothelial cells. The endothelial cells showed a mild degree of pleomorphism, but mitotic figures could not be demonstrated (**Fig. 2**). Red blood cell extravasation and small periodic acid-Schiff–positive hyaline bodies were present. Immunostaining with endothelial cell markers CD31 and CD34 was strongly positive in the tumour cells (**Fig. 3**). Kaposi's sarcoma was diagnosed on the basis of these findings. Tests for HIV were negative.

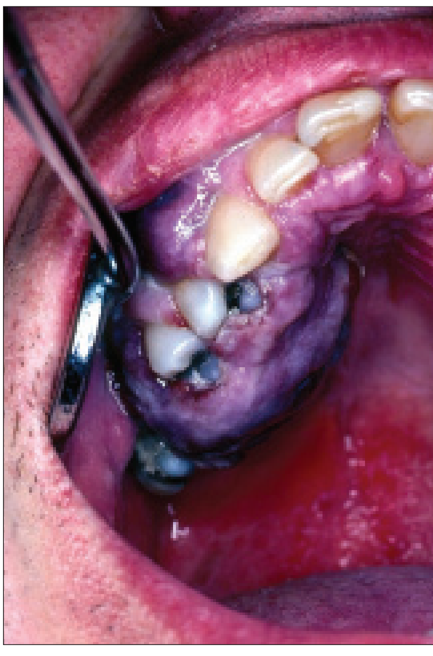

Figure 1: *Kaposi's sarcoma of the palate and gingiva (not the patient described in the report).*

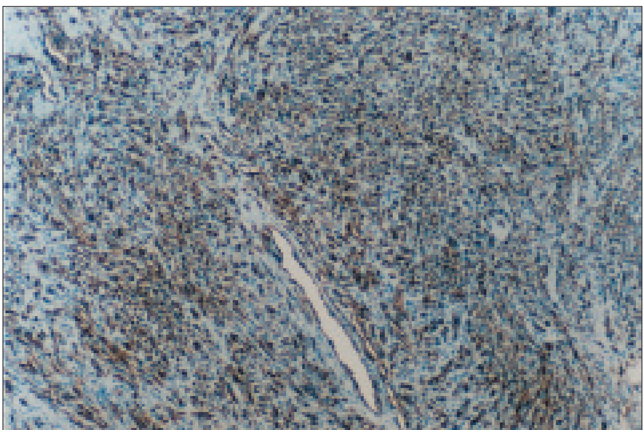

Figure 3: *Photomicrograph showing positive immunostaining of tumour cells with endothelial cell marker CD31 (magnification ×100).*

The patient did not return for a follow-up visit or for the biopsy results. She died in August 2002 (1 year after the biopsy) as a result of viral pneumonitis, secondary to renal failure and hypertension. No post-mortem examination was performed, but there was no evidence that additional Kaposi's sarcoma lesions had developed.

Discussion and Review of the Literature

The cause of Kaposi's sarcoma has been linked to a recently discovered human herpesvirus, HHV-8. HHV-8 is a DNA virus that occurs worldwide but shows major geographic variation. It has a global seroprevalence of between 2% and 10% and is presumably under immunologic control in healthy individuals who become infected.[7]

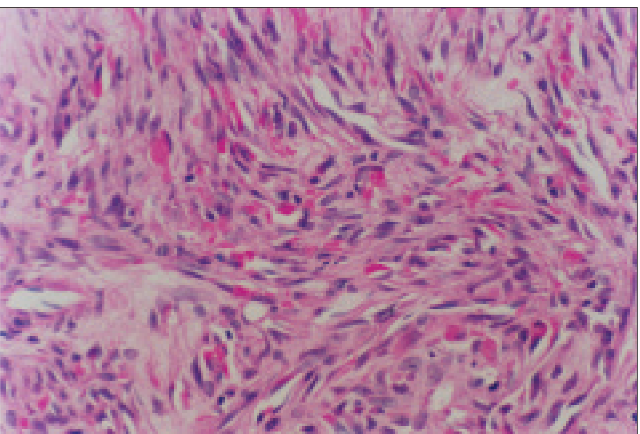

Figure 2: *Photomicrograph demonstrating the proliferation of endothelial cells and numerous slit-like vascular spaces (hematoxylin and eosin, magnification ×200).*

This virus is transmitted mainly by sexual contact and is strongly associated with Kaposi's sarcoma, body cavity-based lymphoma, primary effusion lymphoma, multicentric Castleman's disease, anaplastic large-cell lymphoma, multiple myeloma and other non-neoplastic disorders.[7,8] Luppi and others[9] reported infection of an adult male kidney recipient with HHV-8 and the subsequent development of visceral Kaposi's sarcoma. The Kaposi's sarcoma developed 4 months after the transplantation. This patient later experienced progressive, severe peripheral cytopenia in the presence of normocellular or hypercellular bone marrow with hemophagocytosis. HHV-8 was the sole pathogen detected by polymerase chain reaction in the serum and in the bone marrow.[9]

Interestingly, Sarid and others[10] suggested that HHV-8 may be latent in donor kidneys, with development of Kaposi's sarcoma occurring during post-transplantation immunosuppression. They described 2 patients who received kidneys that were positive for HHV-8 DNA, as well as a third patient in whom Kaposi's sarcoma developed as a result of reactivation of pre-existing infection.[10] Kapelushnik and others[11] described the development of Kaposi's sarcoma in a 17-year-old male after he received a kidney from his HHV-8 seropositive father. Barozzi and others[12] have shown that post-transplantation Kaposi's sarcoma often derives from the seeding of donor-derived progenitors.

Four clinical types of Kaposi's sarcoma are recognized[3,13]:

- the chronic or classic type, occurring in late adult life, usually in men of eastern European descent
- the endemic or lymphadenopathic type, seen in Africa
- the AIDS-related type

- the transplant-associated or iatrogenic type, associated with immunosuppressive therapy in patients who have received solid organ transplants.

The reported prevalence of Kaposi's sarcoma in kidney recipients has varied. Haberal and others[5] reported a 30% prevalence of Kaposi's sarcoma and found that it occurred more commonly in patients who had received cyclosporine as part of their immunosuppressive regimen. In contrast, Margolius and others[14] reported an 8% prevalence. In their study of 989 renal transplant patients, 95 malignancies occurred in 75 patients; 5 of the 95 lesions (5%) were Kaposi's sarcoma, of which only 1 case occurred in the oral cavity. The Kaposi's sarcoma lesions presented with limited skin involvement (in 1 patient) or as disseminated forms of the disease: necrotic oral lesions (in 1 patient), disseminated skin involvement and lung metastases (in 1 patient) and widespread skin lesions with lymphadenopathy (in 2 patients). All of the patients in that study had received immunosuppressive agents: azathioprine with or without cyclosporine and steroids. Four patients experienced complete tumour regression at all sites upon withdrawal of the immunosuppressive drugs. Lessan-Pezeshki and others[15] reported a 0.88% prevalence of Kaposi's sarcoma in renal transplant patients. Kaposi's sarcoma developed in 18 of 2,050 patients; all of those affected had received cyclosporine as part of their immune-suppressive regime.[15] Andreoni and others[16] observed a higher risk of Kaposi's sarcoma among renal transplant patients than among liver transplant patients, although more of the latter showed HHV-8 seroconversion after transplantation; 16.1% of all patients in the study were HHV-8 seropositive before transplantation.[16]

The coexistence of Kaposi's sarcoma and tuberculosis in a renal transplant recipient receiving immunosuppressive therapy has been reported.[17] The lesions were aggressive and involved the oral mucosa, the cervical and mediastinal lymph nodes, the gastrointestinal tract and the lung. The tuberculosis was detected incidentally during the histological examination of an excised lymph node. The patient was given 12 months of antituberculous chemotherapy. Immunosuppression was gradually tapered over a 2- to 3-week period, and the Kaposi's sarcoma subsequently regressed completely, despite its apparent aggressive nature. The patient remained disease free after a follow-up period of 30 months. However, the kidney allograft was rejected, and the patient required reinstitution of dialysis.

The oral presentation of Kaposi's sarcoma may mimic gingival hyperplasia.[18,19] Cyclosporine is often implicated, and 2 such cases have been reported in which Kaposi's sarcoma was present in hyperplastic gingiva of patients who were receiving cyclosporine.[19] Cyclosporine on its own tends to produce a generalized, erythematous, fibrotic gingival hyperplasia, whereas Kaposi's sarcoma produces a more localized, red–purple enlargement. If the oral cavity is affected by Kaposi's sarcoma in transplant patients, the lesions are usually located on the palate or the oropharynx.[18]

Histopathologically, the progression of Kaposi's sarcoma can be divided into 3 phases: the patch or macular stage, the plaque stage and the nodular stage.[3] The patch stage is usually characterized by a proliferation of small vessels, which results in an irregular vascular network surrounding existing vessels. The lesional endothelial cells are bland-appearing and may be associated with the presence of chronic inflammation. In this phase the lesion may resemble granulation tissue. The plaque stage is characterized by the further proliferation of vascular channels and the development of a prominent spindle cell component. In the nodular stage, there is increased proliferation of the spindle cell component to form a nodular tumour-like mass that resembles other spindle cell sarcomas such as fibrosarcoma. However, many slit-like vascular spaces are present. All phases may show extravasated red blood cells, hemosiderin pigment and hyaline globules.[3,20] CD34- and CD31-positive marking of the endothelial cells is valuable in confirming the diagnosis of Kaposi's sarcoma. Immunohistochemical staining of Kaposi's sarcoma suggests that it shows lymphatic differentiation rather than capillary endothelial differentiation.[13] Immunoreactivity to capillary or lymphatic markers may vary with the type or stage of the disease, but recently vascular endothelial growth factor receptor 3 (VEGFR-3), a sensitive marker of lymphatic differentiation, has been identified in most cases of Kaposi's sarcoma.[13]

Treatment of post-transplantation Kaposi's sarcoma is directed toward reducing the immunosuppressive drug regimen. Duman and others[21] described 12 patients who experienced Kaposi's sarcoma after renal transplantation, each of whom was receiving prednisone, azathioprine and cyclosporine. Reduction or discontinuation of these drugs resulted in complete remission in all patients.[21]

Conclusions

Kaposi's sarcoma occurring in transplant recipients may regress spontaneously if immunosuppressive therapy is reduced or discontinued. This phenomenon raises the possibility that the lesion may be a reversible hyperplasia rather than a true malignancy.[22] Therefore, treatment of Kaposi's sarcoma in transplant patients usually consists of withdrawal of immunosuppression. If there is no response, chemotherapy may be started. Successful treatment has also been reported with paclitaxel.[23]

The case presented here illustrates the importance of dental providers closely assessing the treatment needs of long-term transplant survivors because of the potential occurrence of secondary malignancies (including Kaposi's sarcoma, squamous cell carcinoma and lymphoma) in the oral cavity. ❖

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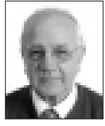

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A Closer Look at Diagnosis in Clinical Dental Practice: Part 6. Emerging Technologies for Detection and Diagnosis of Noncaries Dental Problems

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• **Liam Addy,** BDS, MPhil, MFDSRCS •
• **Gerardo Maupomé,** PhD •

Abstract

The final article of this series examines some recent innovations in diagnostic procedures for noncaries dental problems and assesses the potential for new endodontic and periodontal methods to become everyday tools of the dental clinician.

MeSH Key Words: *decision support techniques; periodontal diseases/diagnosis; predictive value of tests; risk assessment methods*

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In this series[1–5] we have introduced a variety of statistical and epidemiologic methods for assessing diagnostic tools and have demonstrated how these methods can be applied to established and novel diagnostic technologies. In the penultimate article[5] we considered novel methods for detecting and diagnosing demineralized dental tissues. Although caries are still the primary focus of attention for most general dentists, chronic periodontal diseases run a close second. Tooth loss is less common now then in previous decades,[6] but many patients still lose permanent teeth due to periodontal conditions,[7] treatment based on perceived socioeconomic conditions (i.e., dentists are more likely to suggest extractions to individuals in lower socioeconomic groups than those in higher groups),[8] and root decay.[9] In the current paper we examine novel diagnostic technologies for periodontal disease and other important diagnostic dilemmas encountered by dentists.

A glossary, with concise definitions of terms, is available for the entire series (see **Appendix 1**, Glossary of epidemiology terms, at http://www.cda-adc.ca/jcda/vol-70/issue-4/251.html).

Periodontal Diseases

Periodontal diseases are usually subdivided into 2 main categories: gingivitis and periodontitis. Gingivitis is the presence of gingival inflammation with no loss of connective tissue, whereas periodontitis is inflammation of the periodontal tissues at a site where tissue loss has taken place. Such tissue loss occurs where the collagen fibres separate from the cementum, and the junction epithelium migrates apically, with or without commensurable loss of tooth-supporting alveolar bone. This situation illuminates a diagnostic obstacle — Should a site with attachment loss and periodontal pocketing, but without active inflammation, be considered as representing periodontitis? If the clinician takes the stance that the disease must be active to be diagnosed as periodontitis, such a diagnosis could be made only after documentation of additional attachment loss occurring between 2 time points.[10] For a new patient with periodontal problems, this type of longitudinal diagnosis would be impossible, yet the clinician would not want to delay intervention until a second visit could be scheduled. It is therefore prudent to diagnose as periodontitis any periodontally involved sites exhibiting signs of inflammation.[10]

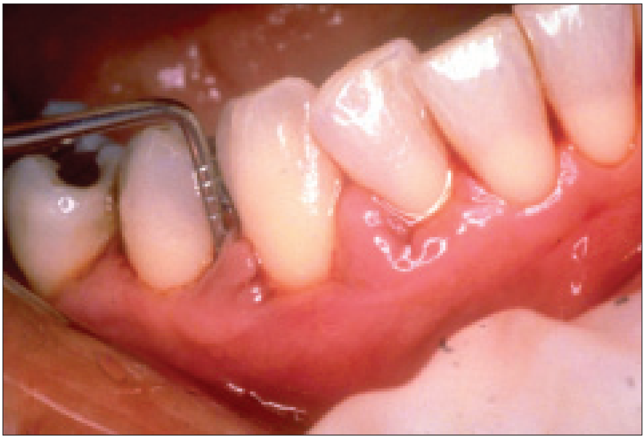

Figure 1: *A conventional probe is used to determine the depth of a periodontal pocket. How accurate are these probes and does their limited resolution reduce their diagnostic value?*

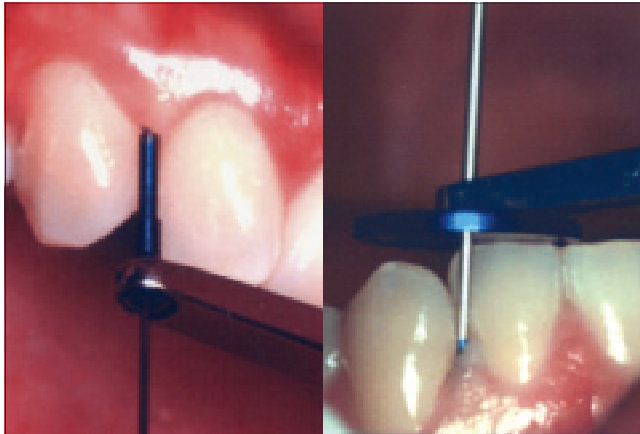

Figure 2: *The Florida Probe. This electronic force-controlled probe has a 100-times higher resolution than a conventional probe. Does this increase translate into a useful diagnostic gain or does it simply provide too much information?*

Table 1 **Repeatability of conventional and force-controlled periodontal probes[a]**

	Repeatability (measured as SD [mm] of mean difference between duplicate measurements)		
Reference	**Conventional**	**Florida, single pass**	**Florida, double pass**
Osborn and others[14]	0.81	1.15	0.44
Osborn and others[15]	0.62	0.82	0.63
Rams and Slots[16]	0.39	0.59	0.62

[a]Adapted from Jeffcoat and Reddy[13]
SD = standard deviation.

The data usually collected during a routine clinical examination include demographic, medical and social details; dental history; periodontal probe measurements; radiographic findings; and miscellaneous observations, such as spontaneous gingival bleeding, plaque volume and bleeding on probing.[11]

Enhancement of a Traditional Method — Reliability of Probing

Periodontal probing, a commonly used technique, provides the clinician with measurements of 2 important variables: probing depth and loss of clinical attachment. Probing depth is the distance from (usually) the gingival margin to the base of the probeable crevice.[10] Loss of clinical attachment is measured from the cementoenamel junction to the base of the pocket. Relative attachment loss (RAL) is measured from another fixed point such as a stent and is not necessarily related to root length. RAL is, in general, used to determine disease progression over a period of time or within clinical trials comparing different interventions. For a fuller discussion of the methods currently used to objectively quantify the progression of attachment loss in periodontal disease, and for guidance in choosing specific analytic frameworks, the reader is referred to the excellent review by Beck and Elter.[12]

In addition to improvements in the analytic and methodological aspects of measuring periodontal disease, the use of electronic force-controlled probes is becoming increasingly popular. Do such devices offer any diagnostic improvement over conventional systems, such as the Michigan O probe (**Fig. 1**)? A number of studies[13] have examined the repeatability, indicated by standard deviation, of one the most popular force-controlled systems, the Florida probe (Florida Probe Corporation, Gainsville, Fla.) (**Fig. 2**), relative to that of conventional systems (**Table 1**). It is important to mention that the Florida probe takes measurements from the occlusal or incisal surfaces, and the data generated therefore incorporate tooth height.

The studies have shown that for single site measurements, the force-controlled probe offered no improvement in accuracy over the conventional probe; however, when each site was examined twice and a mean value determined, error was significantly less with the Florida probe. With all types of probes, an increase in pocket depth leads to an increase in standard deviation. The Florida probe, however, had greater resolution, with precision of 0.1 mm (the traditional probe allows resolution of only 1.0 mm). This greater resolution also explains some of the reduction in repeatability — higher resolution usually leads to greater opportunities for disagreement. The automated system used by the force-controlled probes reduces, or eliminates, errors in data entry. It is worthwhile to keep in mind that the 1996 World Workshop in Periodontics developed a consensus paper stating that automated recording and presentation of data by force-controlled probes offered no diagnostic advantage over conventional probes.[17] It should also be noted that force-controlled probes are considerably more expensive than conventional probes.

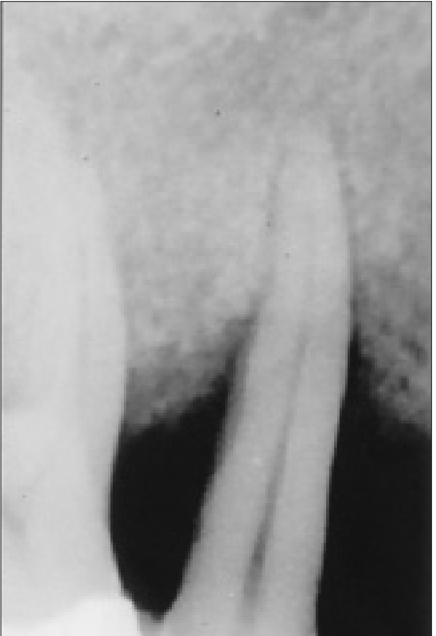

Figure 3a: *Standard radiograph.*

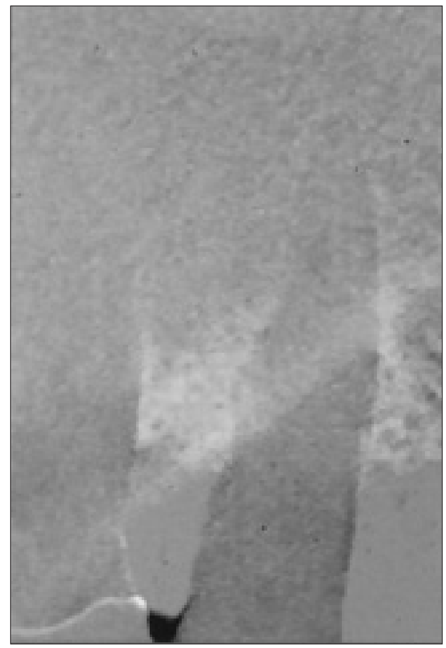

Figure 3b: *Subtraction radiography showing bone loss (white areas) that has occurred since the last radiographic examination (Fig. 3a).*

Radiographic Developments

Digital radiography, discussed previously in this series,[3] has been applied to periodontal diagnosis with great success. Currently available technologies can discriminate changes in bone mass of as little as 1 mg in the imaged area.[13] Whether or not such changes hold substantial clinical relevance should not detract from the obvious advantages that this technology affords. The ability to accurately measure the effects of therapies in a chronic condition such as periodontal disease is of great interest to those developing new treatments, as it permits a reduction in the number of subjects, as well as time, required for clinical trials.

Many different methods of radiographic diagnosis exist, each with its own resolution, reliability and accuracy.[13] Radiographs are most commonly assessed by visual interpretation, usually via transillumination. Studies suggest that such interpretive radiology detects changes in bone only after 30% to 60% of the mineral has been lost, because of basic limitations in the technology, compounded by factors such as the clinician's experience, the method of processing the film and image geometry.[13]

Digital subtraction radiography (DSR) can overcome many of these potential limitations. The principle of DSR is a comparison of 2 images by software that automatically "subtracts" or deletes areas that are the same, leaving only areas of discrepancy (e.g., alveolar bone height). The software can apply quantitative measures and may even be able to correct for skew and magnification (although such systems usually require that the 2 images be identical in size and orientation).[13] These corrections constitute what is known as image registration. Failure to obtain correct registration will confound the data, and the resulting comparative image will exhibit areas of difference that are due to distortion rather than disease progression or regression (**Figs. 3a** and **3b**). DSR[13] can detect change of as little as 1% to 5%,[18] and bone change of 1 mg can be identified with 87.8% sensitivity and 100% specificity.[19] The correlation between measured and actual mass was more than 94%,[19] which suggests that identification of changes in density allow for close correlation between measured and actual mass.[20]

It is likely that as digital radiography becomes more common in dental practice, DSR will become a useful tool for periodontal specialists and anyone who works with populations in which the disease is highly prevalent. Software that enables simple registration and colour-coded analysis of the images, for example showing bone loss in one colour and bone gain in another, should make the system an effective way to motivate and educate patients.

Other Methods

In addition to enhancements to these 2 traditional methods (probing and radiography), a number of additional diagnostic aids have recently become available, including analysis of gingival crevicular fluid, DNA tests of antigenic profiles, chairside tests for asparate aminotransferase (which is released from dead and dying host cells) and neutrophil function assays. Although many of these methods may eventually reach general practice, DSR will remain the predominant technology in the detection, diagnosis and longitudinal monitoring of periodontal disease. This technology may in fact become widespread in the near future, such that many practitioners will require only simple software updates to enable them to conduct such analyses.

Other Advances in Nonperiodontal Diagnostic Science

Dentists observe and treat a wide range of diseases, abnormalities, pathoses and effects of trauma, and the range of diagnostic approaches and devices that could be used in management of these conditions continues to grow. Each field of dentistry has a variety of techniques to assist practitioners in detecting and diagnosing conditions of interest. Many of these technologies are well established

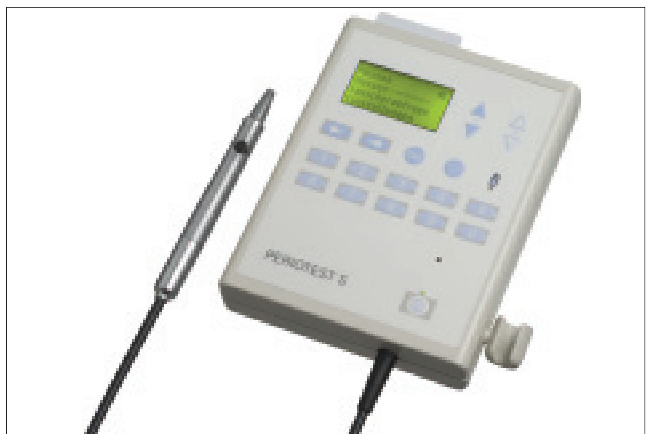

Figure 4a: *The Periotest device.*

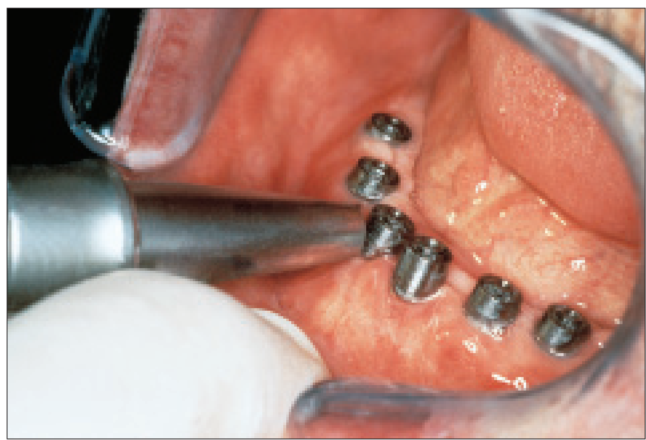

Figure 4b: *The Periotest device is used to determine the stability of the implants by measuring their dampening characteristics. Research has shown that the device is of great value in detecting failed or failing osseointegration.*

and have been available to practitioners for quite some time (e.g., staining with toluidine blue), whereas others are not expected to be widely used until sometime in the distant future (e.g., computed tomography for apical lesions). The following is a brief review of some of the areas in which diagnostic science is advancing.

Endodontic Therapies

Like periodontal researchers, endodontists are interested in using DSR for a variety of tasks, including evaluation of periapical healing after endodontic therapy[21] and detection of apical root resorption.[22] In the assessment of root resorption, DSR analysis had a significantly better receiver operating characteristic value (ROC value of 1.00, or perfect) than traditional radiography value (which had an ROC of 0.64). Resorption as low as 0.5 mm could be detected.[22] Recent research examining the detection of apical lesions by DSR found significant improvements in sensitivity over traditional transilluminated views. The mean sensitivity and specificity of the DSR system for detecting bone lesions of all sizes were 87.9% and 85.2%, respectively. The corresponding results for conventional radiographic images were 47.5% and 97.4%.[23]

The use of apex locators within endodontic practice is now so ubiquitous that it cannot be considered an emerging technology, but researchers are still investigating ways to improve accuracy, especially under moist conditions. Initial in vitro research suggested that the resolution of apex locators would be ± 0.5 mm of the apex. However, the results of contemporary in vivo trials are conflicting.[24] There appears to be little difference between the radiographically measured and electronically determined apical position, and the use of such devices cannot guarantee precise determination of the apical constriction.[25] It seems that apex locators should be selected with care. In a recent comparison of 2 common brands of apex locators (both frequency-based), the mean distance from the apex was 0.19 mm for one and 1.03 mm for the other.[26] This study, which employed teeth that were planned for extraction, had an in vivo component and an in vitro histological assessment. A systematic evaluation of the diagnostic performance of some of the tools described in the present series[1–5] would be useful to aid clinical practitioners in their purchasing decisions.

Advances in Implant Diagnostic Science

Dental implants are rapidly becoming an important treatment option for partially and completely edentulous patients. One diagnostic dilemma within implant dentistry is the assessment of osseointegration and the determination of the presence or absence of peri-implant bone defects. Implant dentistry has used some tests that cannot on their own be considered novel, yet their application in this field is relatively new. The Periotest device (Medizintechnik Gulden, Bensheim, Germany), originally designed to provide a qualitative value for tooth mobility, is now being used to assess osseointegration and the presence of pathological bone loss on implant review (**Figs. 4a** and **4b**).

Teerlinck and others[27] have shown that the Periotest device yields extremely reproducible (and hence reliable) results for measurement of implant osseointegration, with 95% of measurements falling within a range of 1 unit on the Periotest scale. They discovered that the degree of bone apposition was closely related to the Periotest value (PTV). In a 1997 study[28] reporting Periotest data for a total of 1,182 Brånemark implants observed over an 8-year period, the PTV provided an accurate measurement of initial success, healing times and progress. The study also determined that a PTV of 9 or above indicated failure. This threshold value has enabled earlier detection of failure, often before the placement of expensive prostheses. Despite these very encouraging results, others have reported that the

striking height and angle of the Periotest device can affect the data obtained[29] and have suggested that caution is required in the interpretation of the PTV.

The vast majority of Periotest research, however, endorses the use of this device for detection of nonradiographically visible failure or for monitoring of bone remodelling. The device is currently available commercially and, given the desire to reduce the number of radiographs obtained after implant placement, may be of interest to those involved in the surgical and prosthodontic aspects of implant work.

Conclusions

This article is not intended to provide an exhaustive list of dental diagnostic innovations; for example, it has not covered the important area of diagnosis in oral medicine, where the development of new systems for the detection of premalignant lesions is a topic worthy of consideration. Rather, we have presented an overview of some areas in which diagnostic science is developing in dentistry today.

Through this series we have sought to empower the reader by providing the basic tools to assess the value of diagnostic tests, and we hope that these tools will lead to changes in practice habits, by allowing clinicians to determine whether a certain test, such as a bitewing radiograph, will really provide the information that he or she needs. They may also assist clinicians who are considering the purchase of a new diagnostic device. By accessing some of the many online bibliographic databases, such as PubMed, prospective purchasers can avail themselves of the applicable research and, with an understanding of the attributes of a diagnostic test as described in the present series of articles, determine if the proposed tool will address the diagnostic dilemma. In the years to come, we can look forward to tests that can help us to identify active occlusal caries, measures that will provide accurate quantitative information on tooth wear and erosion, and perhaps endodontic tools that will provide accurate, tridimensional working lengths.

Diagnosis is an essential part of what we, as clinicians, do every day. By better understanding the principles behind diagnostic science we can make *informed* diagnostic and treatment decisions and thus better serve our profession and our patients. ❖

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Diagnostic Challenge

The Diagnostic Challenge is submitted by the Canadian Academy of Oral and Maxillofacial Radiology (CAOMR). The challenge consists of the presentation of a radiology case.

Since its inception in 1973, the CAOMR has been the official voice of oral and maxillofacial radiology in Canada. The Academy contributes to organized dentistry on broad issues related to dentistry in general and issues specifically related to radiology. Its members promote excellence in radiology through specialized clinical practice, education and research.

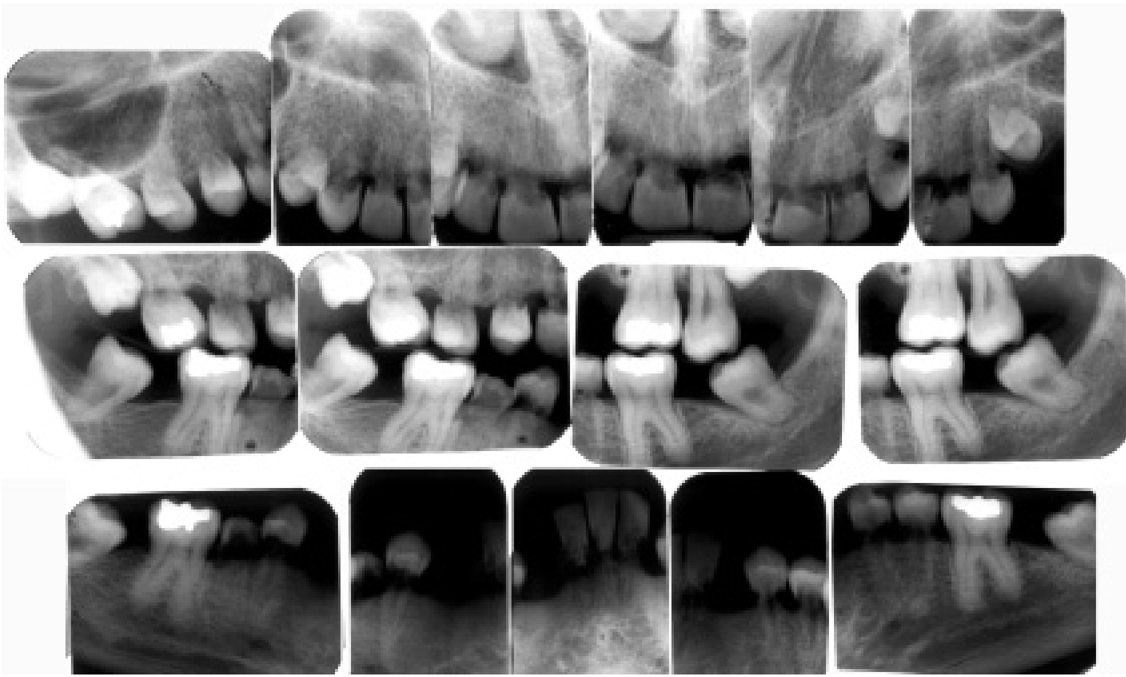
CAOMR Challenge No. 16

Robert E. Wood, DDS, PhD, FRCD(C)

Case History

A 37-year-old man is referred to your specialty diagnostic radiology practice because he is losing his teeth. He has just undergone a complete physical at his physician's office and was found to be perfectly fit. The patient is concerned about the state of his dentition and wonders if he can go ahead with the bleaching and veneers he has his heart set on.

On examination, you note that his teeth are fairly normal looking; however, some teeth are missing and others appear close to falling out. Most of the teeth are not mobile. The patient has excellent oral hygiene and his gingiva look a little puffy but otherwise normal. Use of a periodontal probe triggers self-limiting hemorrhage in multiple areas. Examination with an explorer reveals numerous areas of hard, intact coronal tooth surfaces. When the explorer is moved apically it feels as if it drops into empty space and bleeding ensues. All the bleeding is self-limiting and stops promptly. You decide to expose a full-mouth series of radiographs. ♦



Questions

1. What are your observations?
2. What is the long-term prognosis of this patient's teeth?
3. How should you break the news to the patient?
4. What conditions can cause resorption of teeth?

(See page 630 for answers)

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Answers to CAOMR Challenge No. 16

1. What are your observations?

What strikes you the most in this case is the almost complete loss of root structure on multiple teeth, with adjacent teeth seeming normal; the lack of evidence of periapical rarefying osteitis; remnant roots that are visible as "ghosts"; former root structures that have been replaced with apparently normal bone; the extension of the destructive process into the coronal region of the teeth; and the appearance of sharp edges within the affected teeth. The osseous structures are not affected by the destructive process, and no caries is seen.

2. What is the long-term prognosis of this patient's teeth?

The patient has severe root resorption and the long-term prognosis of the affected teeth is grim.

3. How should you break the news to the patient?

There are several factors to consider when one has to break bad news to a patient. In my oncology practice, where I must from time to time deliver bad news, I consider the following:

- What is the constitutional make-up of the patient? Is the patient steady, or will he or she spin out of control?
- How bad is the news? In the present case it is likely that the patient will lose most of his teeth, certainly the cosmetically important front teeth. Put things in perspective — this is not a fatal condition and the patient can be prosthetically rehabilitated. Obviously, this is still a serious matter and should not be treated lightly.
- Always have a plan of action when delivering bad news. Sometimes this takes time to formulate. You may want to delay talking to the patient until you have had a chance to consult with other health care providers, which in this case could include an oral pathologist, a prosthodontist and a surgeon, so that an appropriate treatment plan can be devised. This will show your patient that you care. It is advantageous to have the plan of action partially implemented by making first contact with those who may deliver subsequent care, so that the patient isn't left feeling too discouraged.
- Don't candy-coat things. In this case, the roots are not going to grow back. Be realistic and firm in your convictions, but not cruel. Personally, I like to sit in front of patients at eye level and make eye contact with them. Your voice should be friendly, informative and above all, sympathetic. If the patient is of modest economic means, suggest an alternative treatment plan that is appropriate for him or her. If this man cannot afford to have full-mouth rehabilitation with implants and fixed appliances, he doesn't need to feel shame about it.

4. What conditions can cause resorption of teeth?

Possible causes of external root resorption are:

- physiologic resorption (primary teeth)
- resorption of impacted teeth
- periapical inflammation
- excessive orthodontic forces (which played a role in this patient's condition)
- benign odontogenic and nonodontogenic tumours
- odontogenic cysts
- re-implantation of avulsed teeth
- traumatic occlusion
- internal resorption
- pulpal death (occasionally)
- root canal treatment (occasionally)
- factitial injury (rare)
- inostosis (rare)
- malignant tumour (rare)
- systemic oxalosis (rare)
- idiopathic hyperparathyroidism (rare)
- periodontal disease (rare)
- reaction to a foreign body (rare)
- idiopathic external root resorption

With no identifiable pathology or any obvious underlying cause, this case has been classed as an example of severe multiple idiopathic external root resorption. The patient will require extensive prosthetic rehabilitation and specialized surgical care. ◆

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Point of Care

The Point of Care section of JCDA *answers everyday clinical questions by providing practical information that aims to be useful at the point of patient care. The responses reflect the opinions of the contributors and do not purport to set forth standards of care or clinical practice guidelines. Readers are encouraged to do more reading on the topics covered. If you would like to submit or answer a question, contact editor-in-chief Dr. John O'Keefe at jokeefe@cda-adc.ca.*

Question 1

How can the limitations of an atrophic mandibular denture-bearing area be overcome when making a definitive impression for a mandibular complete denture?

The creation of a complete mandibular denture for a patient with an atrophic denture-bearing area presents significant challenges to the clinician (**Fig. 1**).

A "suitable" denture-bearing area has both appropriate height and sufficient width, both of which limit the ability of displacing forces to dislodge the complete prosthesis that rests on it. However, in atrophic mandibles, where there has been extensive bone loss, there is little structure available to provide resistance to the displacing forces that arise from occlusal contacts during mastication or functional muscular activity. This problem is complicated by the fact that patients presenting with an atrophic mandibular ridge are typically elderly, have been edentulous for a considerable period of time, have a complicated medical history and may have limited financial means. Although an implant-retained mandibular overdenture might be considered for such patients, this type of prosthesis is usually contraindicated because of insufficient bone or for financial or other medical reasons.

A functional impression technique is often suitable for making an impression of an atrophic denture-bearing area. This type of impression is made by applying a suitable material, such as a tissue-conditioning agent, to the fitting surface of the existing prosthesis. The patient is instructed to wear this material for up to 48 hours, during which time an impression of the atrophic area is made under functional stresses.

Technique

Examine the patient's existing mandibular complete denture, specifically at the buccal and lingual extensions. If these are overextended, reduce these areas first. Clean the mandibular denture with ethanol.

Apply the tissue-conditioning material (Ardee tissue liner, Reliance Dental Manufacturing Co., Worth, Ill.) to the fitting of the mandibular denture as 2 rectangular strips, 1 for each half of the fitting surface. Trim and seal the overlap at the midline with a hot wax knife. Adapt the material to the periphery of the denture, and seal the edges to the labial or buccal and lingual surfaces using the hot wax knife (**Fig. 2**).

Insert the denture in the mouth, and ensure that the maxillo-mandibular relationship or the vertical dimension of occlusion has not been significantly altered. Discharge

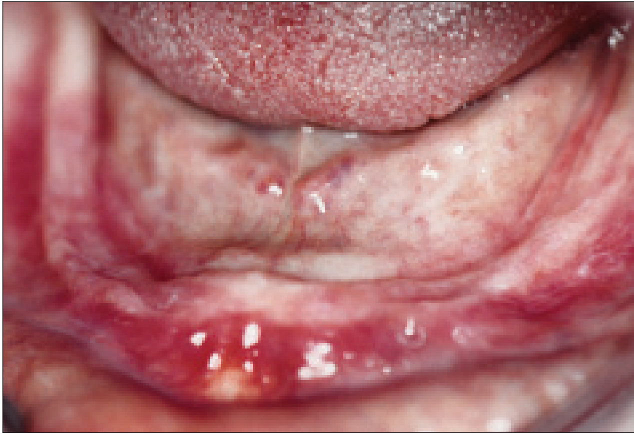

Figure 1: *Atrophic mandibular denture-bearing area.*

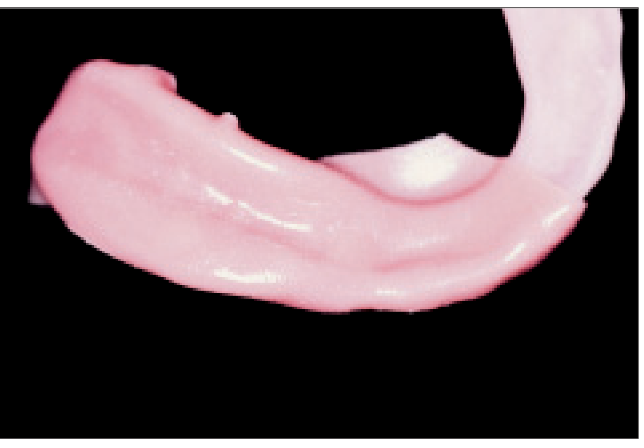

Figure 2: *A strip of Ardee tissue liner applied to the left half of the intaglio of the mandibular complete denture.*

the patient, with instructions to wear the denture continuously for the next 48 hours and to perform habitual oral and masticatory functions.

After 48 hours, re-examine the patient. At this time, a satisfactory functional impression of the denture-bearing area will have been made with the tissue-conditioning agent. Make a master cast using this impression, and use this cast in constructing a replacement complete denture in the usual fashion.

Because this type of impression is made over a number of days and under habitual occlusal loading, the technique should result in even distribution of occlusal forces on the denture-bearing area. It is particularly useful for patients who report constant pain or soreness under a mandibular complete denture. ◆

Dr. Robin O'Sullivan is a statutory lecturer in anatomy at University College Cork, Cork, Ireland. He has no declared financial interests in any of the products mentioned in this article. E-mail: vros@ucc.ie.

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Question 2 What can I do to assess a patient with burning mouth syndrome?

Burning mouth syndrome (BMS) is a symptom complex defined as a burning sensation of the oral tissues in the absence of clinical and laboratory abnormalities. The most common sites are the anterior tongue, the anterior palate and the lips, individually or in combination. Symptoms are often bilateral, but if they are unilateral, other causes of burning, including injury or tumour, must be considered. BMS may be associated with complaints of altered taste and dry mouth. Events leading to the onset of BMS are often not identified, but the condition may follow oral or dental treatment, medication use or viral infection. The pain may interfere with falling asleep, but it rarely wakes the patient and may be less severe during eating. Patients may be distraught and focused on unremitting symptoms.

Causes

BMS is currently believed to represent a form of neuropathy, with potentially varied and multiple causes. Despite the relatively common presentation of this condition in perimenopausal women, hormone replacement usually has little effect on established symptoms. However, it remains possible that irreversible neurologic change may occur in the perimenopausal period; once this has become established, there is no response to hormone replacement. Vitamin and iron deficiency are rare, and symptoms do not respond to supplementation. Other systemic conditions that have been considered include diabetes, because of the peripheral neuropathies that may occur in association with this condition, but no relation to immune-mediated conditions has been seen. Local dental conditions, including dry mouth, reactions to dental materials such as dental amalgam and gold, and candidiasis have not been identified as causative. Tongue habits such as pressing the tongue against the teeth and muscular hyperactivity have occasionally been identified as causative. Despite the common reports of dry mouth in patients with BMS, few studies have reported a reduction in saliva volume. However, some studies have shown changes in salivary constituents, including proteins, mucin, immunoglobulins, changes in pH and buffering capacity, which may be due to altered autonomic nerve function or interactions between the cranial nerves subserving taste, pain and salivation. One recently developed theory suggests that damage to the taste function results in reduced inhibition of painful sensations arising in the oral cavity, which in turn results in BMS.

Angiotensin-converting enzyme (ACE) inhibitors used for treating hypertension (e.g., captopril) have been reported to cause burning and are associated with taste changes. Discontinuing or reducing the dose may lead to remission of oral complaints.

Diagnosis

The diagnosis of BMS (and its management) may be difficult because patients often present with multiple oral complaints, may be focused on their symptoms and may be anxious or depressed, which intensifies the pain experience. It is not known if psychological dysfunction in people with chronic pain is the result or the cause of pain, but it must be considered in patients with complex medical problems and severe symptoms. The diagnosis of BMS is based on clinical characteristics, including bilaterality, increase in

pain during the day, decrease in pain with eating and ruling out potentially related local and systemic conditions. Salivary flow and taste can be assessed. A thorough history and clinical examination are needed to assess the condition, to rule out underlying mucosal or systemic disease, and to determine if medical laboratory testing or referral may be appropriate.

Management

After local oral or systemic conditions have been ruled out or treated, therapy for BMS involves the use of centrally acting medications for neuropathic pain, such as tricyclic antidepressants, benzodiazepines or gabapentin. Studies support the prescription of low-dose clonazepam (0.25 to 1.0 mg) or tricyclic antidepressants (10 to 40 mg). The well-known beneficial effects of tricyclic agents, including amitriptyline, desipramine, nortriptyline, imipramine and clomipramine, in cases of chronic pain are separate from their antidepressant actions. In resistant cases, combinations of medications with different mechanisms of action may be provided; however, there are no studies to guide use of combination therapy for BMS. If a patient is receiving ACE inhibitors, a change in medication could be considered if other choices are available. Topical therapies, including clonidine and capsaicin, may be considered for application to local sites.

Counselling and support may be an important part of overall management. Appropriate management may include referral to practitioners experienced in managing chronic orofacial pain, specifically BMS. ◆

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Dr. Miriam Grushka maintains a private practice limited to oral medicine and orofacial pain in Toronto, Ontario. She is on active staff at the William Osler Health Centre in Toronto, and co-director of a clinic for patients with complex orofacial sensory changes at Yale University's faculty of medicine.

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Question 3

Should panoramic radiography be used as a screening tool to detect oral diseases, including cancer, and is there a recommended interval for obtaining panoramic radiographs?

Current recommendations for diagnostic imaging in dentistry, including panoramic radiography, were developed by a consensus panel convened by the U.S. Food and Drug Administration in 1983. The guidelines were published in 1988,[1] and their efficacy has been assessed on several occasions[2–7] since then.

The guidelines suggest that imaging be performed only after identification of a positive historical finding, sign or symptom, and then only if the identification of the finding, sign or symptom is deemed to have a beneficial impact to the patient's diagnosis or treatment plan. According to the guidelines, panoramic radiography is recommended for children during the early mixed-dentition stage and in late adolescence to detect congenital tooth abnormalities and to establish the presence and eruptive pattern of the developing permanent dentition, including third molars. Before the fabrication of removable dentures for a partially or completely edentulous adult patient, panoramic radiography is recommended to detect impacted teeth, retained tooth roots, and other intraosseous or extraosseous conditions that might affect the success of prosthodontic rehabilitation.

In assessing the need for radiographic examinations in the absence of historical findings, signs or symptoms, disease prevalence should be an important consideration, as should the probability of such lesions being present if clinical signs or symptoms are absent. However, such data are difficult to acquire, and published studies are rare.[8–11] The

limited prevalence data for oral and maxillofacial pathoses suggests that the probability of identifying a serious bone abnormality in a patient without detectable signs or symptoms (an asymptomatic patient) is "infinitesimal."[2] The use of oral and maxillofacial radiography, in particular panoramic radiography, as a screening tool for such lesions is not supported in the literature.

Apart from bitewing radiographic examinations for dental caries, there is similarly no support in the literature for "routine" or "fixed-interval" (e.g., every 5 years) full-mouth intraoral or panoramic radiographic examinations in the asymptomatic patient. Indeed, given the many technical pitfalls of panoramic radiography (e.g., the inability to produce dimensionally accurate images and to resolve fine anatomic details), the usefulness of this imaging technique in general dentistry should be thought of as limited. ◆

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Question 4 How should I treat a patient with xerostomia?

Xerostomia is a condition associated with both a decrease in the amount of saliva produced and an alteration in its chemical composition, which together cause dryness of the mouth. Xerostomia can affect numerous aspects of oral function, contributing to pain, caries and oral infections. It can cause a significant decline in quality of life by decreasing taste sensation. Patients with xerostomia often report an avoidance of some foods, such as dry foods (e.g., bread) and sticky foods (e.g., peanut butter). In addition, xerostomia may impair a patient's ability to speak, cause cracks and fissures in the oral mucosa and contribute to halitosis. Wearing dentures can be very uncomfortable, and chewing difficulties may be exacerbated because of reduced surface tension between the dry mucosa and the denture. Xerostomia is also a contributing factor in the high prevalence of geriatric malnutrition.

Causes

Medications

The most common cause of xerostomia is the use of certain systemic medications. Over 500 medications have been known to cause xerostomia. Causal drug categories include anticholinergics, antidepressants and antihypertensives, to name only a few. With the ageing of the population, xerostomia is likely to be encountered with increasing frequency in the dental setting.

Radiation Therapy

Xerostomia is one of the major side effects of radical radiation therapy for head and neck malignancies, occurring as a result of irradiation to the salivary glands.[1] The degree of destruction of glandular tissue depends largely on the dose of radiation administered. Unless the whole gland

has undergone high doses of radiation, partial recovery over a period of 6 to 12 months is likely.

Management

Prevention of Caries and Comprehensive Dental Care

Because of diminished salivary output, patients with xerostomia are more prone to caries. Thus, diligent oral hygiene, appropriate dietary instruction and regular dental care are essential. Antibacterial mouthwashes such as 0.12% chlorhexidine are useful for inhibiting the development of dental plaque and gingivitis. Fluoride is the single most important intervention in the case of radiation-induced damage. For low-risk patients, the recommended regimen is regular application of topical fluorides plus a daily rinse with 0.05% sodium fluoride. For more severely affected patients, a high-concentration fluoride solution such as 1.23% acidulated phosphate fluoride gel, applied in a tray for 4 minutes, is recommended.

Biotene and Oralbalance

Biotene and Oralbalance products (Laclede Professional Products, Rancho Dominguez, Calif.) contain 3 primary enzymes (lactoperoxidase, lysozyme and glucose oxidase) and a protein (lactoferrin) that is found naturally in human saliva, acting to deprive bacteria of iron. The goal of this combination of enzymes is to replace the salivary enzyme activity that is absent or decreased in patients with xerostomia, thereby reducing harmful organisms but not harming beneficial ones. Biotene is available as a sugar-free chewing gum, an alcohol-free mouthwash, a moisturizing denture adhesive and a toothpaste, whereas Oralbalance is available as a moisturizing gel.

Pilocarpine

In patients with severe xerostomia, systemic cholinergic stimulants such as pilocarpine (brand name Salagen, Pharmacia Canada Inc.) may be prescribed.[2] Pilocarpine is approved for use as a sialogogue only in patients undergoing radiation therapy, in patients with Sjögren's syndrome and for drug-induced xerostomia. In such patients, products such as oral rinses, saliva substitutes and salivary stimulants and techniques such as sipping water are frequently inadequate.

The usual dosage for adults is one or two 5.0-mg tablets 3 or 4 times daily, not to exceed 30 mg per day.[3] Patients should be treated for a minimum of 90 days for optimal results, because the drug must be administered for several weeks before it takes effect and symptoms begin to improve. After this lag period, the time required to increase salivation after oral administration of the drug is 15 minutes; the effect peaks at 60 minutes, and the increase in salivation lasts for 2 or 3 hours.

Dose-dependent side effects of pilocarpine include perspiration, rhinitis, chills, frequent urination, dizziness, increased lacrimation and pharyngitis. Because pilocarpine is a parasympathomimetic drug, there is some risk of cardiovascular and pulmonary side effects.

Contraindications for pilocarpine include narrow-angle glaucoma, uncontrolled asthma and gastric ulcers. ◆

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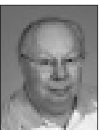

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The authors have no declared financial interests in any company manufacturing the types of products mentioned in this article.

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Suggested Reading

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Clinical Showcase is a series of pictorial essays that focus on the technical art of clinical dentistry. The section features step-by-step case demonstrations of clinical problems encountered in dental practice. This month's article is by Dr. Stephen Phelan. If you would like to propose a case or recommend a clinician who could contribute to Clinical Showcase, contact editor-in-chief Dr. John O'Keefe at jokeefe@cda-adc.ca.

Precise and Predictable Provisional Veneers

Stephen Phelan, DDS

With the increase in the public's demand for esthetic dentistry, porcelain veneers are becoming a popular treatment option. One of the main difficulties with porcelain veneers relative to traditional crowns arises in the provisional phase of treatment. The primary challenge is to ensure that the provisional veneers are retentive yet biocompatible with the gingival tissues, in particular the papilla. Excellence in the provisional veneer technique offers many advantages, including satisfied patients, who can visualize and preview the final restorations; healthy gingival tissues; improvements in laboratory communication through the creation of a blueprint for the final restorations; and capability for occlusal, esthetic and phonetic testing.

This article visually demonstrates a technique for creating provisional veneers to ensure predictability in this stage of the overall treatment.

porcelain veneer treatment. Functional analysis of the study models mounted in centric relation revealed that the desired occlusal design could be achieved with selective enameloplasty. This desired occlusal design, as described by Dawson,[1] with centric stops on all the teeth, lateral guidance on the cuspids and anterior guidance shared with the cuspids and incisors, was achieved over the course of 2 appointments.

The next step in the treatment plan was to take a new set of study models that were poured up in a high-quality die stone. A new set of wax bite records and new face-bow measurements were also required to mount these models on the Sam 3 articulator (Great Lakes Orthodontics Ltd., Tonawanda, NY). The new mounted models were sent, with detailed laboratory instructions, to the ceramist, who then created the diagnostic wax-up.

Case Report

A 30-year-old man with a noncontributory medical history was dissatisfied with his smile after orthodontic treatment (**Figs. 1** to 4). He did not like the triangular shape of his central incisors and the labial position of the right lateral incisor. The functional and esthetic analysis revealed a lack of anterior guidance; multiple large posterior interferences; short, triangular central incisors; and poor arch form, with a proclined right lateral incisor and a palatally positioned right first bicuspid.

The treatment plan called for occlusal equilibration, diagnostic wax-up and 8 feldspathic porcelain veneers.

The occlusal equilibration was needed to achieve the appropriate basic occlusal design before the

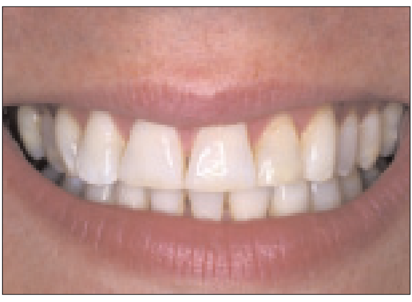

Figure 1: *Close-up view of full smile before treatment.*

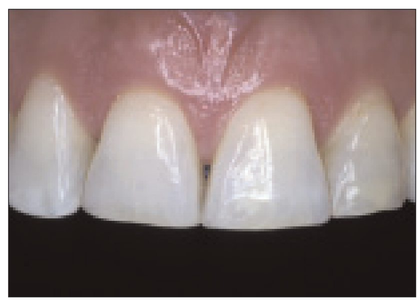

Figure 2: *One-to-one magnification view before treatment.*

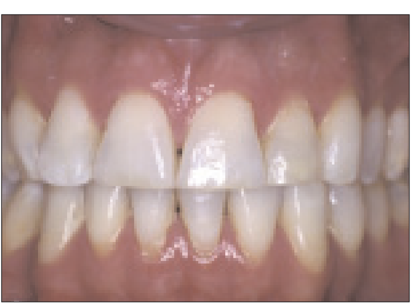

Figure 3: *One-to-two magnification view before treatment.*

Figure 4: *Full smile before treatment.*

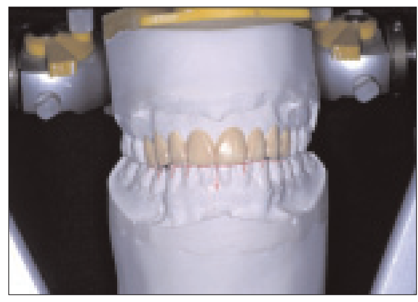

Figure 5: *Diagnostic wax-up on the Sam 3 articulator.*

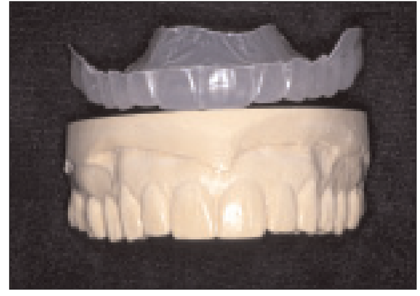

Figure 6: *Duplicate stone model of the wax-up with the provisional stent.*

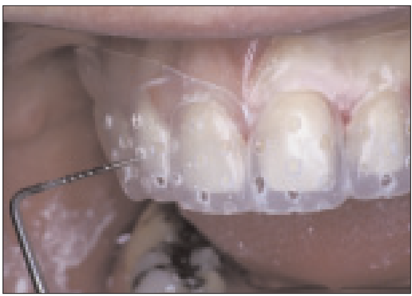

Figure 7: *Second provisional stent to assess the preparation depth.*

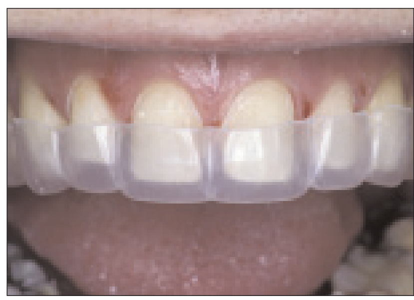

Figure 8: *Provisional veneer stent placed over the tooth preparations.*

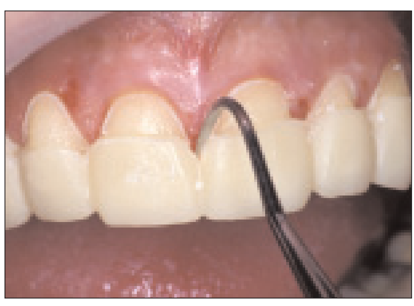

Figure 9: *Removing excess resin in the interproximal area.*

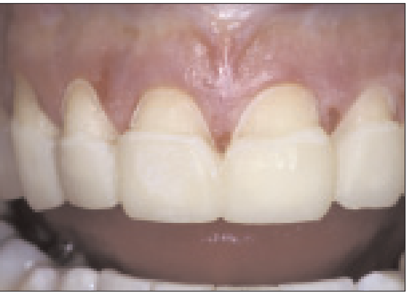

Figure 10: *Body and incisal sections of the provisional veneer roughed in place.*

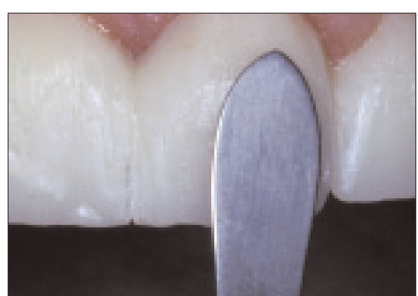

Figure 11: *Gingival third composite resin being sculpted in place.*

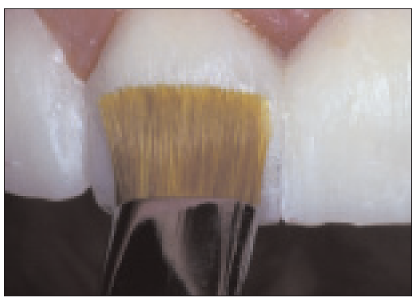

Figure 12: *Gingival third composite resin being smoothed in place.*

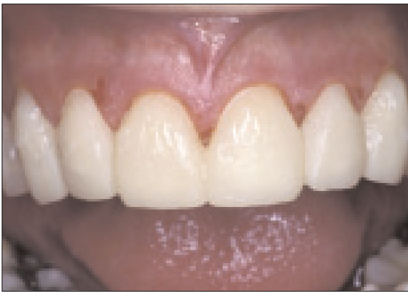

Figure 13: *Provisional veneers roughed into place.*

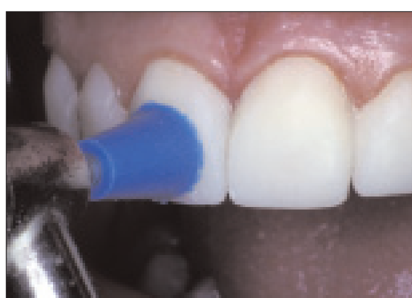

Figure 14: *Adjusting the provisional veneers with polishing cups.*

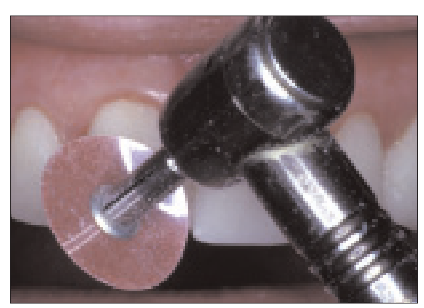

Figure 15: *Adjusting the provisional veneers with Soflex ET disks (3M ESPE, St. Paul, Minn.).*

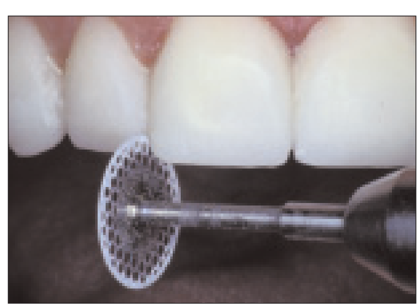

Figure 16: *Adjusting the provisional veneers with Brassler Visionflex disks (Brasseler USA, Savannah, Ga.).*

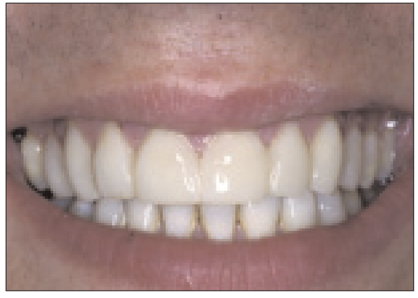

Figure 17: *Completed provisional veneers.*

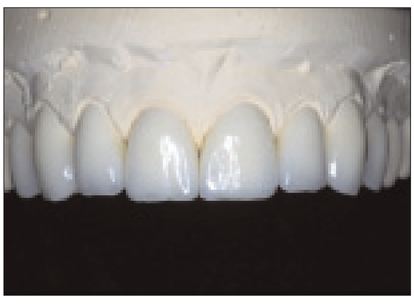

Figure 18: *Completed porcelain veneers on the solid model.*

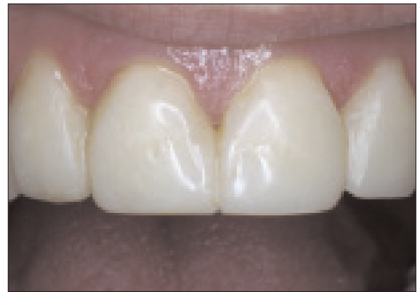

Figure 19: *Provisional veneers 5 weeks after placement.*

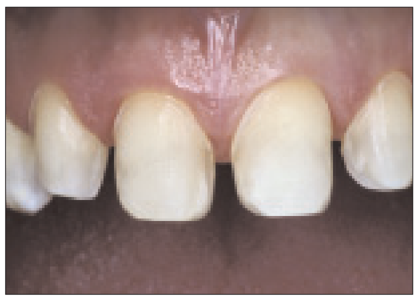

Figure 20: *Excellent gingival health after removal of the provisional veneers.*

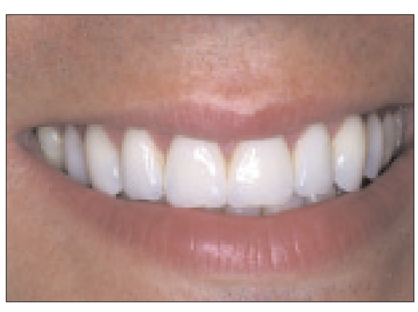

Figure 21: *Close-up view of full smile after treatment.*

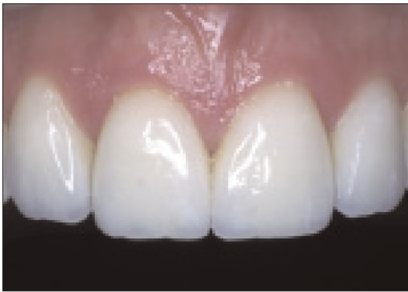

Figure 22: *One-to-one magnification view after treatment.*

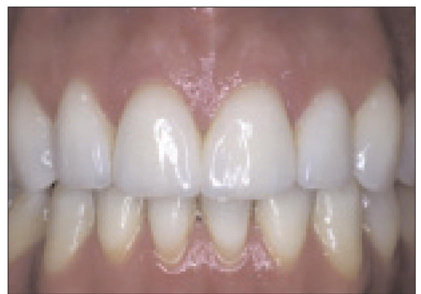

Figure 23: *One-to-two magnification view after treatment.*

Figure 24: *Full smile after treatment.*

Diagnostic Wax-Up

The diagnostic wax-up is the key to creating excellent provisional veneers and ultimately the final restorations (**Figs. 5** to **20**). The detailed laboratory instructions given to the ceramist should include a summary of the patient's desires and expectations, the preferred occlusal design and the desired position of the incisal edge. In addition, the ceramist should receive accurate study models mounted on the articulator of choice, slides or digital photographs of the patient and any photographs of the patient's desired smile.

Clinical Technique for Predictable Provisional Veneers

1. Make a Biostar stent (Great Lakes Orthodontics Ltd.) of the stone duplicate model of the diagnostic wax-up.
2. Trim and customize the Biostar stent to allow access to the gingival third of the tooth preparation.
3. Spot etch a small area of the enamel for 5 seconds.
4. Coat the preparations with enamel adhesive.
5. Load the stent with RSVP light-viscosity material (Cosmedent, Chicago, Ill.) or a high-viscosity flowable resin.

6. Seat the stent and remove excess material, especially in the interproximal papilla area and the gingival third of the tooth preparation.
7. Light cure the resin for 10 seconds on the incisal area and 5 seconds on the body areas.
8. Remove the stent and any further excess material.
9. Place and sculpt RSVP heavy body material (Cosmedent) or a similar shade of composite resin.
10. Evaluate the esthetic results and add any material where desired.
11. Evaluate the occlusal and phonetic results.
12. Finish and polish the provisional veneers.

Laboratory Communication for the Final Restorations

1. Take accurate impressions of the provisional veneers and pour them in a high-quality die stone.
2. Take accurate wax bite records of the provisional veneers.
3. Take accurate face-bow measurements of the provisional veneers.
4. Take a series of slides or digital images of the provisional veneers.
5. Provide the ceramist with written communication about any changes the patient would like in the final restorations.
6. Have the ceramist make the necessary custom putty matrixes of the provisional veneers.
7. Have the ceramist make a custom incisal guide table of the provisional veneers (if desired).

Conclusions

This case illustrates how the time and effort spent on provisional veneers will pay large dividends at the time of the appointment to seat the final porcelain restorations. The precision used to create the gingival margin and interproximal contour will result in healthy gingival tissues, which should help to make the bonding procedures more predictable. The time taken to create provisional veneers with the desired esthetic and functional aspects will give the ceramist the direction needed to create predictable final restorations that will yield results that will be satisfactory to the dentist, the ceramist and the patient (**Figs. 21** to **24**). ◆

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The author has no declared financial interests in any company manufacturing the types of products mentioned in this article.

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MANITOBA - Winnipeg: Established general practice for sale. Professionally appraised. Cost-sharing set-up in mall location with great exposure, parking and new patient flow; 4-day work week with above-average billings. Owner returning to academics/graduate studies. Interested parties e-mail drewbrueckner@shaw.ca or leave message at (204) 477-8753. D1425

ONTARIO - Waterloo: Great location, in a busy plaza (6 medical doctors, pharmacy, Tim Horton's, etc.). Single dentist, exclusivity and a great lease with 3 operatories, 2 fully equipped, ceph-pan. Call (905) 889-2727. D1582

ONTARIO - Oshawa (east of Toronto): Dental office for lease, established for 25 years. Four treatment rooms, reception, lab, storage, parking, pylon signage. High-traffic location. Growing area. $2,300/month plus operating costs. Chris Tyrovolas, Associate Broker, Royal LePage, tel. (866) 273-1333, e-mail ctyrovolas@royallepage.ca. D1592

DENTAL PRACTICE

Saskatoon, Saskatchewan

Established general dental practice for sale. Prime location, 4 operatories, room for future expansion, most equipment less than 5 years old. Low overhead, flexible leasehold, no evenings or weekends, 5-6 weeks annual holidays. Ideal for an experienced associate or a motivated new graduate. The present dentist is available to help in transition.

Please forward enquiries to:

Doug Frondall
Tel. (306) 653-6100
E-mail dfrondall@virtusgroup.ca

D1566

POSITIONS AVAILABLE

ALBERTA - Cold Lake: Our well-established family practice is currently looking for an associate to join our friendly team of professionals. We are looking for a compassionate, motivated dentist with excellent communication skills to assume existing patients as the owner gears down for retirement. There is an opportunity for the right individual to buy all or part of this outstanding practice. We have a successful accelerated perio-hygiene department complete with intraoral cameras. You will enjoy providing all aspects of general dentistry in a busy, progressive, computerized family office. If you are looking for a rewarding and satisfying career with a team committed to providing exceptional dental health, please give us a call! We are located just 3 hours northeast of Edmonton. You can enjoy a quality lifestyle in this beautiful lakeside city. For further information, contact: Kelly Avery, tel. (780) 594-5984 or fax your resume to (780) 594-5965. D1581

ALBERTA - West Edmonton: Unique opportunity in booming West Edmonton. Our friendly dental group is seeking a genuinely caring individual to cover a maternity leave for our owner dentist starting in February 2005. You must be extremely gentle, fun-loving and provide excellent individualized dental care to our well-established patients. Enjoy a high-tech (digital x-rays, computerized, etc.), modern facility with an outstanding team. Experience a must; interest in cosmetic dentistry, pediatrics and light sedation an asset. This amazing opportunity could become a full-time associateship as our senior associate plans to retire in late 2005. Please call Dr. Sylvie Renoir at Time to Care Dental Group in Edmonton at (780) 484-5918 or fax your resume to (780) 484-7819. We look forward to meeting you. D1587

ALBERTA: Well-established Alberta practice, located 2 hours from Edmonton, requires full-time associate dentist. Rapidly growing family practice (50-80 new patients per month) located in new building. Please fax resume in confidence to (780) 872-7334. D1590

ALBERTA - High Prairie: Caring, enthusiastic and hard-working associate needed immediately for a very busy general practice. Emphasis on oral surgery and implants. Be as busy as you want to be and enjoy the outdoors. Only 4 hours from Edmonton. Suits new graduate or experienced practitioner. Locums on a regular basis welcome. Fax resume to (780) 523-4434. D1555

ALBERTA - Okotoks: Solo female practitioner requires a full-time associate. Seeking an experienced associate who can provide top-quality dental services and has a commitment to excellence. Our newly built, ultra-modern facility provides the latest in technology. We have a well-established practice of over 8 years as well as a highly organized and dedicated team. Our practice environment is friendly and focuses on patient care and comfort. We are located 20 minutes south of Calgary. Please fax resume with references to Dr. Helen Robinson, (403) 995-9578. D1567

ALBERTA - Peace River Region: Associateship available for new graduate or experienced dentist. All phases of dentistry. Current practitioner and hygienist booked until March 2005. Practice is not currently accepting new patients despite constant demand. Set your own hours. Rural lifestyle offers many rewards. Low cost of living, excellent outdoor pursuits throughout region and full-service community only an hour away. Clinic in association with hospital, 3 physicians and visiting optometrist. Tel. (780) 524-3864, fax (780) 524-2299, e-mail fishdoc@telusplanet.net. D1575

ALBERTA - Calgary: Experienced associates required for 2 quality locations.

University of Manitoba

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February 12 - 19
Continuing Dental Education
University of Manitoba

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D1594

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ATLANTIC CANADA: Oral maxillofacial surgeon and orthodontist. Opportunities available for associateships leading to partnerships in busy oral surgery and orthodontic practices in the “jewell” of Atlantic Canada. If interested please reply to: CDA Classified Box # 2840. D1433

ATLANTIC CANADA: Oral maxillofacial surgeon. Opportunities available for associateship leading to partnership in all aspects of busy oral surgery practice in Atlantic Canada. Hospital privileges available. If interested please reply to: CDA Classified Box # 2843. D1548

BRITISH COLUMBIA - Port Coquitlam: Associate required. Excellent opportunity for full-time associate in busy, established family practice that is seeking a caring patient-oriented, perio-focused, high-standard individual to join our well-educated professional team. Please send resume and handwritten cover letter to: 2203-2850 Shaughnessy St., Port Coquitlam, BC V3C 6K5 or fax (604) 552-9145. All enquiries directed to office manager, tel. (604) 552-9700. D1595

BRITISH COLUMBIA - Kamloops: Associate required for a busy general practice. Wide range of dentistry and a wonderful staff. Buy-in an option for the right candidate. Interested applicants please call (250) 374-4544 or e-mail abtucker@telus.net. D1596

BRITISH COLUMBIA - Campbell River: Full-time associate required for a very progressive general practice with a high esthetic component. We are building a new facility with a planned opening of January 2005. We will be expanding hours and looking for a highly motivated dentist to join our exceptional team. The office is located in southern Campbell River in the beautiful Willow point area and offers unbeatable ocean view and recreational opportunities and unmatched lifestyle. Leading to future partnership. Buy-in for the right individual. Fax (250) 287-7392. D1551

BRITISH COLUMBIA - Chilliwack: Full-time associate position available to dentist committed to continuing education/excellence in patient care. Area offers year-round recreation including skiing, boating, hiking, etc., 100 km east of Vancouver, mild climate. Present associate has busy practice and is leaving the area. There is potential for partnership. Reply to: Dr. Michael Thomas, 102-45625 Hodgins Ave., Chilliwack, BC V2P 1P2; tel. (604) 795-9818 (res.), (604) 792-0021 (bus.). D1553

BRITISH COLUMBIA - Invermere on the Lake: Lifestyle in paradise! Ski in the winter at Panorama Mountain Village and enjoy the lake in the summer. Full-time associate required, ultimately leading to partnership. Well-established family practice in a newly built office at a thriving resort town. Promising opportunity for right individual. Tel. (250) 342-0776, e-mail rskanan@telus.net. D1561

Appraisal

The appraisal has become an essential tool for the practice owner. The appraisal will assist you, the purchaser, the bank, the accountants and the lawyers to make informed decisions. Practices are almost always sold with the aid of a professional, and comprehensive appraisal. Appraisals have a typical lifespan of 1 to 5 years.

Brokerage

Canada wide we have dozens of practices for sale. Our team of 11 associates (5 of whom are dentists) is available for private consultations. We suggest that you make arrangements for an after-hours appointment so that we may better understand your practice, your future plans, or your unique circumstances.

Practice Preservation

In the event of a sudden death or disability, it is important to have an appraisal with your valuable documents. Waiting for a complete appraisal to be performed in this time of need can decrease the sale price of your practice. Appraisals can be updated quickly at little or no cost. Call for a free copy of our Practice Preservation package.

Private Consultation

When you want to know how to exit dental practice ownership with dignity and profitably, call your ROI Corporation associate to arrange a private consultation. We have provided this service to thousands of your colleagues since 1974. When you are considering a strategic change within your practice, call ROI Corporation.

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D1236

BRITISH COLUMBIA - Gibsons: Associate wanted. Would you like to practise dentistry full time or part time as an associate in a small quaint seaside town on one of the most beautiful coasts in the world? Then Gibsons, B.C. (Sunshine Coast), is the place for you. We are the newest office on the peninsula with Adec/Sirona equipment including intraoral camera and digital x-rays. The town itself offers a good community life with all the best in water and mountain vistas along with all the modern amenities for comfortable living. We are a short majestic ferry ride to Vancouver. Please call us at (604) 886-5395 or e-mail advantagedental@dccnet.com. D1576

BRITISH COLUMBIA - Vancouver: Specialist periodontal practice in prime Vancouver location seeks a periodontist to associate with our progressive growing group. We emphasize ideal periodontal, dental implant, prosthetic and esthetic treatment. Close to ocean, mountains and Whistler. Long-term association for the right person. Fax resume to (604) 913-1610. D1577

BRITISH COLUMBIA - Terrace: Third dentist needed for a busy practice with 2 experienced dentists and 4 hygienists. Periodontist and oral surgeon plus anesthetist schedule regular clinics in the office. In an area of exceptional natural beauty with outdoor recreation and wilderness adventure opportunities moments away, yet multiple daily flights to Vancouver provide easy access to city getaways. Our flexible practice may be the perfect fit for you if you are just starting out and seeking opportunities to learn new skills, or if you would like to slow down and enjoy a lower-stress lifestyle. Preference given to applicants willing to make a longer commitment, but shorter-term or part-time arrangements could be considered. For more information, please contact: Bonnie Olson, tel. (250) 638-0841. D1547

NEWFOUNDLAND AND LABRADOR - Mount Pearl: Full-time associate required for busy general dentistry practice. This new 8-operatory office offers a full range of treatments near busy commercial/residential zone. Option to buy in. Please call Mount Pearl Dental, tel. (709) 364-3663 or fax resume to (709) 364-3663. E-mail drwalsh@mountpearldental.nf.net D1578

NORTHWEST TERRITORIES - Fort Smith: Associate dentist for Fort Smith Dental Clinic. Utilize the full range of your skills working in our modern, well-equipped clinic with skilled and experienced staff. The centre for Wood Buffalo National Park and located beside world-class whitewater of the Slave River rapids, Fort Smith is an ideal location if you love the outdoors. This is a full-time position offering an established patient base and an excellent compensation package. Opportunity for future partnership and/or succession. Tel. (867) 872-2044, fax (867) 872-5813, e-mail whill@auroranet.nt.ca or send resume to: Dr. Hill, Fort Smith Dental Clinic, PO Box 1047, Fort Smith, NT X0E 0P0. D1191

NOVA SCOTIA - Bedford: Associate needed for part-time position (3 days a week) in busy family practice. Excellent clinical and patient skills a must. Please fax resume to (902) 835-7835. D1585

NOVA SCOTIA - Yarmouth: Experienced, full-time associate required with potential buy-in opportunity in 2-dentist/3-hygienist, newly renovated, 8-operatory clinic in downtown heritage house. Excellent work environment and support staff. For more information, contact: Dr. Michel A. Comeau, tel. (902) 742-0191, fax (902) 742-0179 or e-mail macdent@klis.com. D1557

NOVA SCOTIA - Halifax: Associate required for a busy family practice, 2-3 days a week. Please fax resume to (902) 443-5614 or e-mail dentalstaff@hotmail .com. D1542

NUNAVUT - Iqaluit: Associate position(s) available for immediate start. Established clinic offers generous package and full appointment book to associates. All round clinical skills are your ticket to a wide range of recreational activities! No travel required and housing available in Canada's newest and fastest growing capital city. Please apply to: Administration, PO Box 1118, Yellowknife, NT X1A 2N8; or tel. (867)873-6940, fax (867) 873-6941. D1497

NUNAVUT - Iqaluit: Dentists wanted! Busy Nunavut dental clinic requires full-time associate in Iqaluit. Community of 7,000 +, only serviced by one other clinic. Part-time locum positions also available in other communities. Excellent remuneration. All travel and accommodations paid for. Fax CV to (867) 979-6744 or e-mail coreygrossman @yahoo.ca. D1373

ONTARIO - Central Niagara Region: We are seeking an associate dentist for a family-oriented, well-established practice in the Niagara Peninsula. We offer excellent support staff and hygiene program, in a newly renovated location. Position is either full or part time. Please fax your resume to the attention of the office manager, (905) 734-9878. D1591

ONTARIO - Ottawa (central east): Unique opportunity for associate leading into buying 30% of a $1.4 million, 6-operatory solo practice. Over 3,500 active charts. Positive, hard-working, goal-oriented dentist with a passion for dentistry. Bilingual preferred. Tel. (613) 282-5331. D1593

ONTARIO - West of Toronto: Excellent associate dentist opportunity you don't want to pass up! Working in a well-established practice with a positive environment and a foundation based on respect, equality and valuing others. From being busy and fully booked on day 1, to ongoing professional development, you will have the chance to practise dentistry at its finest! This modern and progressive practice will keep you exposed to many different aspects of dentistry, like cosmetics, implants and the ability to refer within, as we have many specialists working alongside of us. If you are a team player and are looking for the perfect practice, fax resume to (905) 846-8854. D1568

ONTARIO - Brockville and Morrisburg: Experienced associate required for 1 of 2 well-established, busy practices. Enjoy a small-town atmosphere and the scenic beauty of the 1000 Islands region with easy access to large city centres. Only 30 minutes to Kingston and 60 minutes to Ottawa. For more information contact: Dr. George Christodoulou, Altima Dental Canada, tel. (416) 785-1828, ext. 201, e-mail drgeorge@altima.ca. D1269

CLINICAL DENTISTS

1 Full-time, Continuing Position

The Centre for Community Oral Health (CCOH) is a progressive, multi-site, not-for-profit organization that administers oral health outreach programs on behalf of the University of Manitoba. We require self-motivated, community minded dental professionals to work as part of our oral health team.

Reporting to the CCOH director, the successful candidate will provide a wide range of clinical dental services within various long-term care institutions and community dental clinics in accordance with existing professional and program standards. Emphasis is also placed on oral health promotion and disease prevention.

Applicants eligible for Manitoba licensure should reply, in confidence, to:

Dr. Doug Brothwell
Centre for Community Oral Health
Faculty of Dentistry, University of Manitoba
D108 - 780 Bannatyne Avenue
Winnipeg, MB R3E 0W2
Tel. (204) 789-3892 • Fax (204) 789-3951
Email brothwel@ms.umanitoba.ca

D1586

DALHOUSIE
University

FACULTY POSITION
DEPARTMENT OF ORAL AND MAXILLOFACIAL SCIENCES

The Faculty of Dentistry, Dalhousie University, Halifax, Nova Scotia, is seeking applications for a full-time, limited-term appointment possibly leading to a tenure track faculty position at the rank of Assistant, Associate or Full Professor, in the Division of Oral and Maxillofacial Surgery in the Department of Oral and Maxillofacial Sciences.

Responsibilities will include graduate and undergraduate teaching, collaborative research, continuing education and associated administrative duties. The division collaborates with the School of Biomedical Engineering in graduate teaching and research, and also with other divisions, departments, faculties and universities.

Academic rank will be based on the successful candidate's qualifications, experience, and achievements. It is expected that the successful applicant will have graduated from an accredited specialty program, and must be a Fellow of the Royal College of Dentists of Canada in the specialty of oral and maxillofacial surgery. The successful candidate should have experience in treating patients with cancer and it is preferred that he/she has subspecialty training in head and neck cancer as well as facial reconstruction. The successful applicant will also have demonstrated experience in research, undergraduate and graduate teaching, and administration. Salary and rank will be commensurate with qualifications and experience.

The successful applicant must be eligible for licensure in Nova Scotia. Private practice privilege is integrated with the appointment.

All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. Dalhousie University is an Employment Equity/Affirmative Action employer. The university encourages applications from qualified Aboriginal people, persons with a disability, racially visible persons, and women.

Dalhousie University is one of Canada's leading teaching and research universities, with four professional faculties, a Faculty of Graduate Studies and a diverse complement of graduate programs. Collaborative and interactive research is encouraged, as is cooperation in teaching among the faculties. We inspire students, faculty, staff, and graduates to make significant contributions to our region, Canada, and the world. Dalhousie is located in Halifax, Nova Scotia, a vibrant capital city, and the business, academic, and medical centre for Canada's east coast.

Review of applications will begin in October 2004. Applicants should submit a letter of application with curriculum vitae, up to three reprints of research publications and the names, addresses, and internet addresses of three referees to: **Dr. H. A. Ryding, Chair, Search Committees, Faculty of Dentistry, Dalhousie University, Halifax, Nova Scotia B3H 3J5.**

D1560

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The University of Toronto is strongly committed to diversity within its community and especially welcomes applications from visible minority group members, women, Aboriginal persons, persons with disabilities, members of sexual minority groups, and others who may contribute to further diversification of ideas. All candidates are encouraged to apply; however, Canadians and permanent residents will be given priority.

Interested individuals should submit a covering letter and CV, in confidence, to Dr. Gaetan Tardif, Vice President, Medicine & Physician-in-Chief, Toronto Rehabilitation Institute, 550 University Ave., Toronto, ON, M5G 2A2. Applications should be submitted by November 15, 2004.

About Us:

Toronto Rehab is at the forefront of one of the most important and emerging frontiers in health care today - rehabilitation science. As a fully affiliated teaching and research hospital of the University of Toronto specializing in adult rehabilitation, complex continuing care and long term care, Toronto Rehab's goal is to advance rehabilitation and enhance quality of life for the millions of Canadians who experience disabling injury or illness every year.

The dental clinic is dedicated to providing dental care to an inpatient and outpatient population taking the patient's medical status and needs into consideration.

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D1589

ONTARIO - Ottawa East: Associate required. Well-established family dental practice is looking for a bilingual dentist to join its team. Forty minutes to Ottawa, 40 minutes to Montreal, 40 minutes to the Laurentians. For more information, contact: Francine, tel. (613) 632-4159. D1565

ONTARIO - North Toronto: Pediatric dentists wanted immediately for full-time/part-time positions in busy, modern North Toronto pediatric dental practice with in-office general anesthesia. Future buy in possible. Reply to: CDA Classified Box # 2842. D1543

ONTARIO - Fort Frances: Full-time associate needed for extremely busy family dental practice. Strong hygiene program. Newly renovated building with state-of-the-art computerized operatories, intra-oral cameras, digital x-ray, electronic handpieces etc. Excellent staff and working conditions. Practice on American border in northwestern Ontario. Ideal for person with an outdoor, active lifestyle. Emphasis on caring attitude and good-quality dentistry. An outstanding opportunity for the right candidate to become a future partner, if mutually agreeable. Present associate leaving to further education. Please call (807) 274-5365 or (807) 274-5370 (days), (807) 274-5549 (evgs. and wknds.) or fax (807) 274-1738. Write to: 1201 Colonization Rd. W, Fort Frances, ON P9A 2T6. D1516

ONTARIO - Northern: Full-time associate. Our team is currently seeking a disillusioned dentist. We require a practitioner who's still looking for the dream job or whose dream job has turned out to be nothing as expected. If you find you're spending more time sitting in the waiting room reading magazines or newspapers as opposed to treating patients, something is wrong! We are looking for an applicant who wants to relocate outside of the Greater Toronto Area (specifically northern Ontario). Someone who is interested in befriending our patients and becoming part of our community. We require a confident professional who will be excited about successfully practising all facets of dentistry, an individual who will respect/appreciate our team and expect the same back. The applicant should revel at only having to commute 5 minutes to work and be glad for the opportunity to set his or her own schedule. If you want to be part of a community that provides you the opportunity to be a successful and well-respected professional and gives you a viable choice between town living or lakeside dwelling, this may be for you. Should you meet the above criteria please e-mail your resume to natgrant@ntl.sympatico.ca or fax to (705) 335-6556. The successful applicant can expect high patient volume, low downtime, low receivables and high remuneration. D1597

ONTARIO - Ottawa East: Associate opportunity. Busy, progressive family practice requires a motivated, enthusiastic bilingual (English/French) dentist to work with 2 other dentists in providing total patient care. Newly renovated, well-equipped, 5-operatory office. Located 20 minutes east of Canada's capital, Ottawa. Optional future buy-in potential. For further information, please contact: Julie, 2911 Laurier St., PO Box 999, Rockland, ON K4K 1L6; tel. (613) 446-3368, fax (613) 446-5006. D1483

QUEBEC - Eastern Townships: Windsor, near Sherbrooke. We are giving an associate the opportunity to become part of a mature and fully competent team. Pleasant and motivating work atmosphere. Please fax resume to (819) 845-7854. Tel. Dr. Jacques Vaillancourt, (819) 845-3080. D1371

YUKON TERRITORY - Whitehorse: Come for the beauty - mountains, lakes and rivers. Or come for the opportunity to practise dentistry where you are appreciated and well compensated. Have a look at our Web site www.klondike-dental.com. Tel. (867) 668-4618, fax (867) 667-4944. D1422

TEXAS - Dallas: Growing dental company in and around Dallas is seeking full-time associates. Must be licensed or qualified to be licensed in Texas. Highest compensation package in the state; earn $200,000 - $400,000. Company to handle all immigration matters. Please call (630) 788-7167. D1513

VERMONT, US: Dentists and oral surgeons. Opportunities for general dentists in Rutland, Montpelier and Lake Champlain areas. Openings available for employment, private practice and practice acquisitions. Enjoy the splendor of the Green Mountains and Lake Champlain, all part of the unbeatable Vermont lifestyle. Contact: Lynn Harris, tel. (800) 288-1730, fax (518) 266-9289, e-mail lynnharris@harrisbrand.com. D1538

Positions Sought

CANADA: Toronto, Ottawa, Vancouver, Calgary, Edmonton, Halifax. Canadian dentist with vast experience in family practice available November 2004. Locum, associateship. Full time or part time. E-mail bickertonalex@hotmail.com, tel. 011-971-2-634-8507, mobile 011-971-50-532-3439. D1544

Equipment Sales & Service

ITEMS FOR SALE: Pain X 200 - infrared light therapy device; The Wand - anesthetic delivery system; Apollo Elite - curing light; David PAL - audio visual entrainment (for soreness/pain). All items slightly used. Purchased from a dental clinic auction. $2,400 for all or best offer. Contact: Dean, tel. (604) 741-1258 or (604) 886-7308. D1583

LASER FOR SALE: Cerelas D-15 900 nm diode laser. Manufacture date: May 2000. Slightly used but in excellent condition. Purchased from seized dental clinic auction. Comes with all attachments, video, manual, etc. Retails for $43,000. Selling for $25,000. Contact: Dean, tel. (604) 741-1258 or (604) 886-7308. D1584

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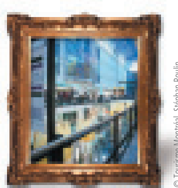
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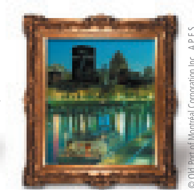
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